MOTOR CITY MADNESS: SPORTSMAN'S CUP

July 1989

Radio Control
CAR ACTION

47380

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THE WORLD'S PREMIER R/C CAR MAGAZINE

KYOSHO GOES FORMULA 1

MONSTER MAYHEM!
The Titans Return: WHICH RULES?

SECRET WEAPON!
RC10 TORPEDO

SOLUTION:
ELIMINATE RADIO GLITCHES!

C&M's Lethal COBRA

FULL-ON RADICAL!

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ON THE COVER: Center: Tamiya Clod Buster during a speed run in Clash of the Titans. Photo by Rich Hemstreet. Bottom: C&M Cobra II with Nissan GTP body. Photo by Wally David. Above: Kyosho's new 1/18-scale F-1 racer, photo by Wally David. Top right corner: Kyosho Double Dare on the move, photo by Rich "The Wall" Hemstreet.

Radio Control Car Action (ISSN 0886-1609) is published monthly by **Air Age, Inc.,** 251 Danbury Rd., Wilton, CT 06897. Second Class postage paid at Wilton, Connecticut, and at additional mailing offices. Subscription rates are 1 year (12 issues) $25 (foreign $35); 2 years (24 issues) $47 (foreign $67). **Postmaster:** Send Form 3579 to **Radio Control Car Action, P.O. Box 427, Mount Morris, IL 61054.**

EDITORIAL

by CHRIS CHIANELLI

HELP! I'M LOSING CONTROL!—of the mail, that is. We at *Car Action* are very excited about the huge amount of reader response we're getting, but the load has become increasingly difficult to manage. So I'm asking all of you to help us sort the mail more efficiently, because this, in turn, will allow us to correspond better with you.

All I ask is that you mark your letters: "To the attention of: Editorial Letters Dept.; Eagle Eye of the Month Dept.; Readers' Rides Dept.; Track Directory," and so on. Doing this will not only help *us*, but it will also greatly help *you* by ensuring that your letter quickly reaches the correct department and, subsequently, *Car Action*. This also means that if you have an "Eagle Eye" entry and a submission to the "Letters" pages, you should send two separate letters, each clearly marked according to its destination. Thanks a lot for your cooperation.

In order for us to choose more effectively what will go into *Car Action*, we need to know what you want, so we've put together a Readers Survey, which you'll find elsewhere in this issue. Please fill it out and send it in. The survey will give us firsthand input about what's important to *you*. Oh, and by the way, every returned survey will go into a ballot box, and a drawing will be held to find the winner of a *Futaba Magnum PCM*. Remember: You gotta be in it, to win it; so send in those questionnaires!

The Speedworks Sportsman Cup Race presented by Trinity was, in the words of "Smitty" Pond, " ... awesome ... the kind of race we need more of ... much more." From what Smitty told me, it seems that the sponsored racers weren't allowed to race, but instead served up valuable tech and race information all weekend in seminars. Sounds like a welcome switch; read all about it in Smitty's report in this issue.

I know many of you are annoyed because "Clash of the Titans, Part II" has been delayed, and I apologize. Honestly though, I much prefer to shift the blame to Rich "The Wall" Hemstreet, but it isn't his fault either. The simple truth is that a part on one of the trucks repeatedly broke, so we had to wait for a new part, which, claims the manufacturer, solves the problem. But if you still want to blame somebody, that's OK; just write to "The Wall," care of *Car Action* and yell at *him*, but just remember that Hemstreet is built like a Green Bay lineman. Why do you think we call him "The Wall."? ■

MESSAGE FROM THE AYATOLLAH OF RADIO CONTROLLA:
Don't race with a sour face!

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LETTERS

WHERE TO WRITE TO US

If you're writing to the editors (and we'd love to hear from you), please be sure to address your letters to "Letters," *Radio Control Car Action*, 251 Danbury Road, Wilton, CT 06897.

Busters Beware!

It has been brought to my attention that some serious problems have arisen since Steve Pond's Project Clod Buster was published in the April '89 issue of Car Action. Steve used a Novak speed controller that performed very well using the two Trinity Clod Buster motors, but take note! The Trinity Cold Buster Motors are hot modified winds and ***cannot*** *be used with most speed controllers that have reverse! The reverse mode circuitry can't handle two motors drawing on it simultaneously, and* ***it will melt down!*** *Use only one of the high-quality controllers with forward only. If you need reverse, use two cheaper controllers with reverse. Use a "Y" cord from the receiver to the two controllers and dedicate one controller to each motor, thereby dividing the load. I'd like to thank Arty at Fantasia Hobby World in Queens, NY, for bringing us this information.*

CC

Sergeant Ripper Repents

Hey guys, I've got a good one. I joined the U.S. Army in June of '88. When I was in basic training, I wrote my parents and asked them to send me my *R/C Car Action*. Well, when the Drill Sergeant was passing out mail, he looked at my mag and said that I couldn't have any magazines while in Basic, so he grabbed it with both hands and ripped it in front of the whole platoon. Oh, I about died. I wanted to take his *RC Modeler* books and burn them in front of the whole brigade. Well, at the end of Basic, during graduation, he told me that he didn't want to rip up something that he was interested in also. He told me that was almost a sin, and I said it was a sin. The first commandment: Thou shalt not rippeth up thy mags.

CHRISTOPHER D. DETOUR
8th Signal BN, U.S. Army

Private First Class Detour, due to your admirable conduct and self-restraint under adverse and extreme conditions, you are awarded the Car Action Subscrip-

tion of Honor (free of course). Congratulations. And Sergeant Ripper, if you pick up a copy of Model Airplane News, our sister publication, you'll rip up your RC Modeler yourself. I'm personally glad PFC Detour didn't do it; it's not easy running R/C cars in the brig!

CC

Eagle Eye of the Month

Totally radical mag! Your magazine is the best on the shelves and it beats the heck out of the other competition. I recently picked up your Monster Truck issue—totally cool! I loved the reviews on the Clod Buster and Double Dare. The reason for this letter is not only for the compliments, but also for the Eagle Eye of the Month Award. In your March '89 issue, you have a very tricky discrepancy. On page 28, at the top, the aqua-blue WCM Supermodified is called a RACO Supermodified on page 30. Keep up the good work!

CHET MOWREY
Southfield, MI

Congratulations Chet, yours was the eighth correct answer. Be on the lookout for your Car Action decals. CC

Thunder Down Under

I'm an Aussie, and I recently purchased a Tamiya Thundershot. I made the mistake of driving it on asphalt too much, so I need to replace my tires. Will those lovely Avante tires and rims fit my car, or can I adapt them to fit? By the way, your R/C mag is the best!

DREW BAKER
Melba, Australia

Drew, the Avante wheels will not fit on the Shot because it doesn't have the quick-change setup found on the Avante. However, I suggest that you run road tires if you plan to run your off-roader on asphalt. A very realistic-looking radial-type tire is made by a company called IMEX. These tires are quite inexpensive in the states and will fit directly onto Tamiya rims. Their address is: IMEX Model Co. Inc., 53 Trade Zone Court, Ronkonkoma, NY 11779.

CC

(Continued on page 10)

LETTERS

Deadfoot

Hey, *R/C Car Action*, what's up? I think your mag is the best on R/C car stuff! I buy it all the time.

I have a problem with my Tamiya Blackfoot: It only lasts 3 to 4 minutes on a charge. I have a Trinity Monster Stock motor, 14-tooth pinion gear, regular Blackfoot differential gears, a Hobbico AC/DC multi-charger, and no battery eliminator.

My friend says it's the charger because of the detachable male/female plugs. I have a hunch it may be the differential and/or the torque of my motor. Which is it? And what should I do about it? I plan on having it last 10 minutes or more.

JASON ASHMAN
Reading, PA

Jason, your hunch makes much more sense to me. The differential or any other moving part that's not moving freely will cost you in speed and running time, which is why ball bearings help so much in both areas. However, you didn't say how many batteries you were using. If it was only one, you may have a dead cell in your pack. Try another pack and see if your time goes up, if not, then explore the binding possibilities. If you still have problems, contact us and state what batteries you're using: SCR, SCE or SC cell. It will make a difference in how to charge them.

CC

It's Gonna Blow!

I read your mag all the time, even though there's only one store that sells it in Campbellton, New Brunswick.

My new speed controller is the KO Propo CX-IIR with reverse. I have a Sanyo 7-cell battery pack and the speed controller calls for a stock battery pack. Would it affect the speed controller?

ERIC GIONET
Campbellton, Canada N.B.

Eric, forget using the CX-IIR for Modified racing. It was never designed for a super hot wind and seven cells. Believe me, I know first-hand. I destroyed one of these units when I was in a bind and threw it in my Modified Sprint Car with seven cells and a Trinity Pure Gold. Surprisingly, it did last into the 3rd heat. It's a good unit for six cells and a stock motor.

CC

Convincing Cobra

I'm a recent R/C fan of one year and I discovered your fantastic magazine very shortly after becoming addicted to R/C. I've thoroughly enjoyed your informative articles and I've used a number of your good ideas. Soon, I intend to purchase an R/C boat. Having recently moved into an area with many small ponds and lakes, I'm looking forward to my water ventures and to future R/C boating articles similar to the ones in your January issue. You might say that your Cobra article convinced me to make this new R/C purchase. It sounds like a blast!

Thanks again for such an excellent magazine.

GARY A. BURRELL
Mt. Morris, IL

Gary, in case you're not sure, all the hop-up goodies you've purchased for your 1/10-scale electric cars, motors, speed controllers, batteries, chargers, etc., can be used in the electric fast boats that you're interested in. In the next issue, I'm reviewing a new twin motor, surface-drive, offshore racer from Traxxas that comes with electronic speed controller. Also, you'll get a lot of info about electric fast boats in our sister publication, Radio Control Boat Modeler. Check it out.

CC

Broken Battery Tabs

I own a Tamiya Road Wizard and I have a problem with my Eliminator battery pack. Every once in a while the wires break off, but that usually isn't a problem, because I can just solder them back onto

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LETTERS

(Continued from page 10)

the steel-ribbon leads that are still attached to the battery. This time, the leads also broke off and I don't know how to reattach them, since they look like they were originally spot-welded. Do you know what I should do? Your magazine is the best!

MARK LUZZI
Ridgefield, CT

Mark, if your tabs (or steel-ribbon leads, as you put it) have broken off, you can solder directly onto the battery cell, if you do it correctly. Use a 40- to 60-watt soldering iron, not a gun, and let it reach full temperature. Then clean off the end of the cell with fine emery paper or a nail file. Next, working with a hot iron so you don't spend a lot of time contacting the iron to the cell, tin (coat) the end of the cell with a thin layer of solder. Tin the wire ends, making sure you expose new wire from the insulation after you've cut off the old, dirty wire. The main thing is not to heat up the cell too much. By tinning first, you can obtain a good solder joint quickly.

CC

Shockingly Incorrect

Thanks for the best mag in the solar system. I've wanted to put oil shocks on my Blackfoot, maybe the Kyosho Gold, but my local hobby shop told me that oil shocks would blow the diff. Is that right? Can you guys please give me the story on the oil shocks and beefing up the Blackfoot diff.

BRIAN HENNING
San Diego, CA

Brian, the only way to fit Gold shocks to your Blackfoot is with JG shock towers. Without the use of these shock towers, it's not possible to use the Gold or similar shocks (they'll attach to the chassis, but the long shocks are too long and the short shocks, which will inhibit suspension travel, are too short.) If you want to keep the stock mounts, Tamiya oil dampers are the way to go.

Your hobby dealer appears to be grossly misinformed. (I find it hard to believe that a hobby shop would tell you this.) The Blackfoot's diff and dogbones are inherently weak and will eventually fail, but use of oil shocks will never cause or even accelerate the wear process. In fact, superior dampening will only extend the life of all suspension components, including the diff assembly. The Thorp diff will solve the Blackfoot diff problems. A complete cure for the Blackfoot's ailing tail is a Thorp diff, axles and dogbones. For more information refer to the Project Blackfoot in the May '89 issue.

CC

Correction, Correction!

Race Prep is the exclusive importer of the AYK Pro Radiant and all other AYK cars, not AYK Racing, as we inadvertently printed in our June issue. Also in that issue, we incorrectly advised Jason Stinson in a letter entitled Dead Diff. We recommended an MIP ball diff for his Blackfoot, but they don't manufacture one. The correct manufacturer is Thorp Manufacturing. So sorry for the mix-up!

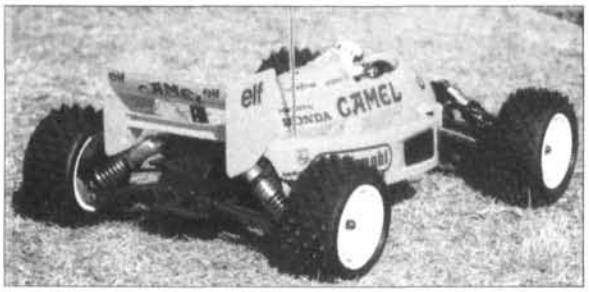
CC

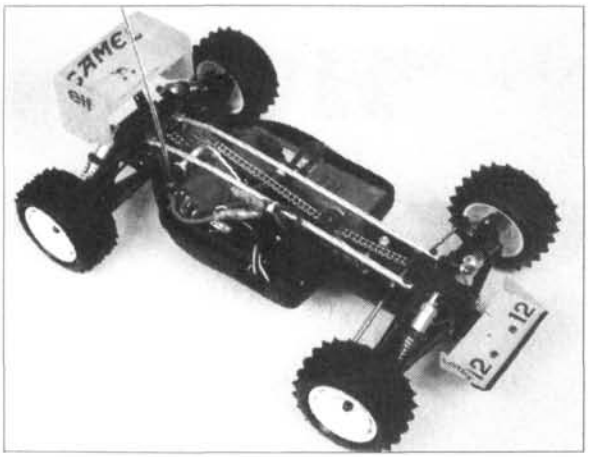
We welcome your comments and suggestions. Letters should be addressed to "Letters," *Radio Control Car Action*, 251 Danbury Road, Wilton, CT 06897. Letters may be edited for clarity and brevity. We regret that, due to the tremendous number of letters we receive, we cannot respond to every one.

INSIDE SCOOP

by CHRIS CHIANELLI

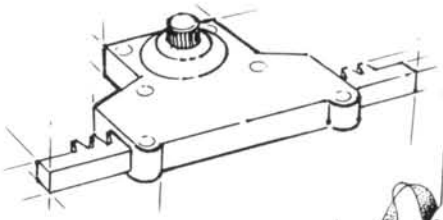
The R/C CAR industry is rapidly advancing, with new products being offered at a head-spinning rate. So, I'll make manufacturers nervous, but feed you R/C squirrels who are hungry for info, by bringing you a special report on security leaks and "late-in" items. Here goes!





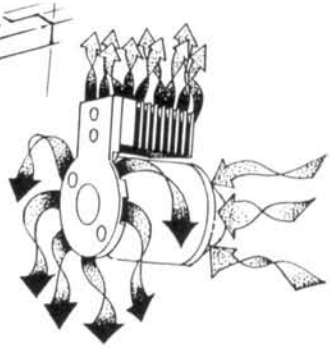
INDY OFF-ROADER

Off-roading with an Indy Car; now, *there's* a creative thought. This car is a combination of an Optima Mid and a homemade chassis brought together under a Tamiya F-1 body. I'm sure the creator of this contraption has other hilarious hybrids up his sleeve. Not being one to be outdone, I'm working on my very own GTP Grasshopper.



RACK-AND-PINION STEERING

Winning Edge Products of West Bridgewater, MA, has developed a new rack-and-pinion steering unit for the RC 10, Ultima, Optima Mid and JR-X2. Called the Pro-Steer, this unit is not only reported to take out slop, but will also deliver a totally positive, linear steering response. The Pro-Steer weighs less than 1 ounce and features ball bearings.



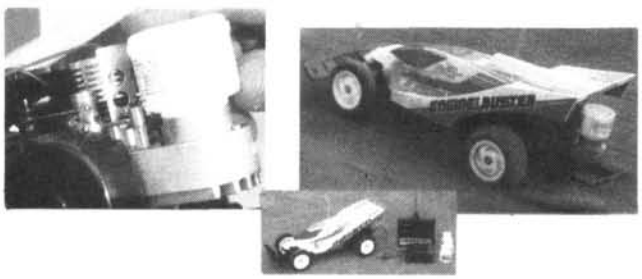
STAY COOL ... BE FAST

Also from Winning Edge is the Turbo Motor Cooler, which dissipates heat by using the air-flow that occurs naturally in a spinning motor. The Turbo Motor Cooler has 15 square inches of heat-sink area; it weighs less than 1 ounce; and it can be installed easily.

KYOSHO 1/10-SCALE GASSER

Here's a look at Kyosho's new O.S. .10-powered 2WD Rampage 10 off-roader. This shaft-driven car borrows suspension parts from the Ultima and drive-train parts from the RS200. Great features are a pull-starter on the

O.S. and a quick-fill tank needed for endurance races. No word yet on availability.



MYSTERY CAR OF THE MONTH

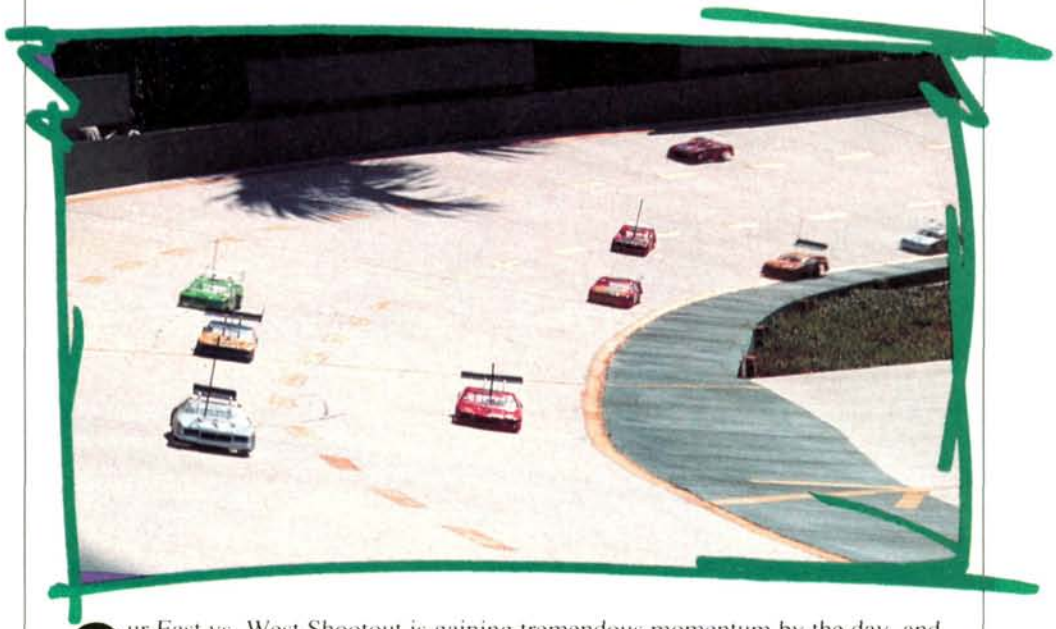
Here's a shot that Lady Lingafoon, our spy in the Orient, took on the fly, while being chased by security at the highly secret Sugahara Flats test site in the northern part of the country. It's a rear-engine, rear-fueling, gas-powered, off-roader called the Engine Buster. Anyone who can supply us with information that helps lead us to indict and expose this off-road enigma will receive a set of *Car Action* decals. Remember: You must address your envelopes to "Mystery Car of the Month."

Keeping the industry BUGGED, I'll see you next time—or sooner, if I catch you in my spyglass! CC

PUBLISHER'S PAGE

by LOUIS DeFRANCESCO

EAST-WEST SHOOTOUT



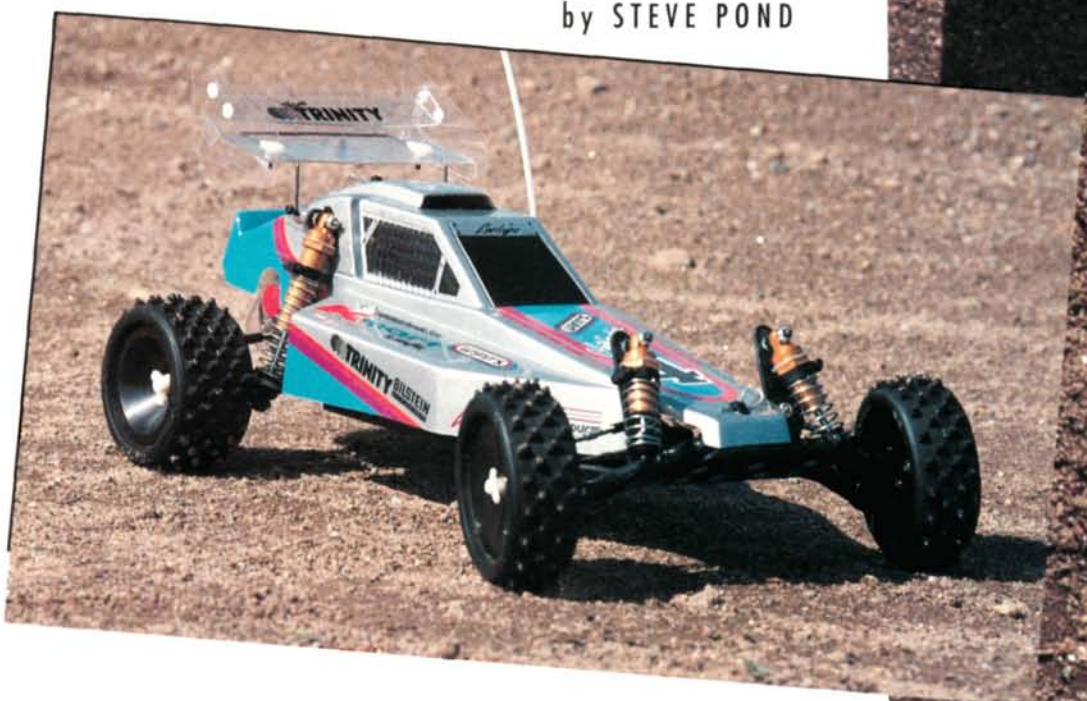
Our East vs. West Shootout is gaining tremendous momentum by the day, and arrangements are now in high gear. As I mentioned last issue, it promises to be the R/C event of the decade. Gary McAllister and Dan Moynihan will be hosting the West Coast race at the Thunderdrome, and Bob Hosch of Lake Whippoorwill Speedway will host the East Coast race. For more details, see pages 18 and 19.

During a meeting a few weeks ago with one of the top manufacturers in the industry, the question was posed, "Define the purpose of your magazine and what differentiates it from the other R/C publications?" Though this question was broad-based, it was easy for me to answer. "Our objective," I simply stated, "is to inform and help the modeler." Just as new product information and objective product evaluations are needed, of equal importance are "How To" and technical articles. Modelers need to know how it's done, whether they're modifying or detailing their first car or setting up a differential for a national race. We strive more and more to help the modeler, and many editorial meetings are spent brainstorming on what areas of R/C we need to better address with helpful articles. We are constantly encouraging you to write so we can react to your input and, I might add, your input is most important to us. We tailor the editorial profile of this magazine on your input, as well as industry trends.

In the consumer magazine business, we work three months in advance of the cover date. Even though this issue is dated July, it's mid-April as I write. Many of you, especially those who live in the colder climes, are getting those cars and radios out and heading to the local track, brushing up for this summer's racing. Maybe this season it will be your turn to be the "hot trigger!" Good luck. ■

RC 10 TORPEDO

by STEVE POND



R/C CAR ACTION has given you many informative "project" articles and technical "How-Tos" since the introduction of Associated's* RC10, and you might think that we've dealt with just about every possible modification to this car. In fact, utilizing the plethora of available after-market parts, we could come up with *at least* another 15 useful articles on the RC10.

The beauty of the RC10 is that, in its original state, it can burn up the back yard or the playground at considerable speed and with a high tolerance for trees, large rocks or any of the other obstacles you shouldn't hit. Or you can take it one step further and race your stock RC10 with a mechanical speed controller in the production class that's becoming popular around the country, and you'll have a considerable advantage over many comparably priced cars.

You can also race the RC10 in the *modified* ranks. As your budget allows, you can steadily improve your RC10 and graduate to the highest levels of competition. However, if you'd like to enter this type of racing, when it comes to deciding where your money would be best spent, a tremendous choice faces you, as there's a seemingly endless number of different configurations.

A graphite chassis, some stock tranny tricks and new front-suspension geometry add up to high performance at a moderate cost.

I'll tell you how to prepare your RC10 so that it's able to keep up with the top-level competition for a reasonable price. One of the biggest misconceptions is that the more you spend on your car, the faster it will go (similar to the cubic-dollars concept of full-scale racing). While it's true that you must lay out some green to keep pace, I've seen too many enthusiasts spend until they're on the edge of bankruptcy, hoping the performance of their cars will increase in proportion to the amount of money spent.

The starting point for this project was the ball-bearing version of the RC10. If you're going to race competitively, you must have ball bearings—it's *that* simple.

The most popular change to the RC10 is the replacement of the stock aluminum chassis with a graphite one—and for a very good reason. The closer you can keep your car to the weight limit, the longer your batteries will last and the faster the car will accelerate, etc. It isn't that the stock RC10 chassis is inadequate; in fact, a number of racers, including the Associated Team drivers, still use the stock chassis. But in an effort to save weight, many take the chassis to a machine shop, chop down its sides and mill holes in the bottom where all that material isn't necessary. If you have access to this type of machinery and can have that kind of work done for little or no cost, by all means, go for it. But if you

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RC10 TORPEDO

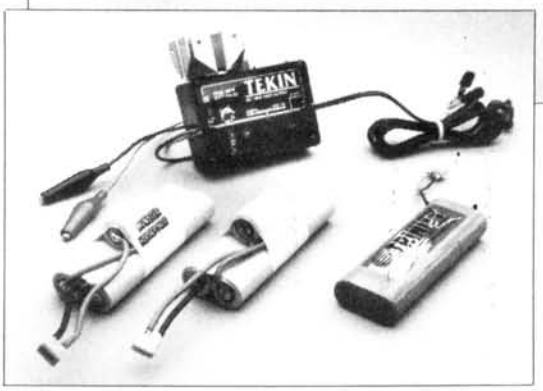
(Continued from page 21)

have to pay the going rate, it will eventually cost you more than a graphite chassis. Several graphite chassis are available in just as many configurations, and this leaves you to decide which best suits your needs.

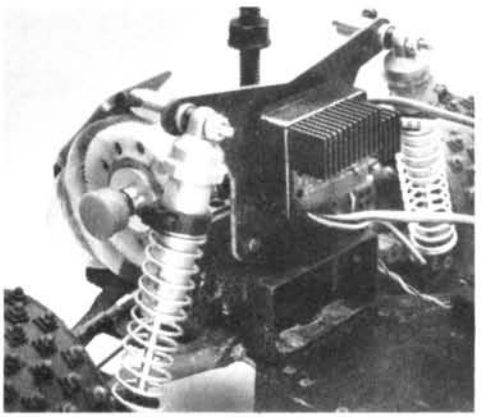
Saddle-pack chassis work well on the RC10, if you don't mind assembling packs to fit, taping them in and cutting them out for each run. The easier alternative is using a chassis designed for the original battery mounts, e.g., the Trinity* chassis used here, which allows the use of off-the-shelf batteries and facilitates quick battery changes. I also prefer a chassis with a narrow front end rather than a wide one (I'll explain later). The Trinity chassis has four holes drilled on either side in which to mount the battery holders in a side-to-side manner. The two extra holes allow you to move the battery forward to apply more weight to the front wheels. I chose to mount the battery front-to-back, so I had to drill and countersink two holes for the forward battery holder. The front-to-back battery configuration allows a good front-to-rear weight ratio, and it also allows the car to recover more quickly from rolls induced by turning or uneven terrain. There are no modifications required to attach the chassis to the stock RC10 components, but it does interfere with the travel of the front suspension arms. Even with the use of the Andy's* front arms, it's necessary to bevel the upper edge of the chassis from the front corner to about 1/2 inch past the bend in the chassis. To save a little more weight, a pair of Trinity shock towers was also added, but if you're on a tighter budget, you could do without these, because they save only a little weight.

The stock RC10 suspension is one of the best in the business, but over the years, other companies have experimented with widening the front end for more sure-footed handling. Using the aforementioned wide-front chassis is one way to move the wheels out closer to the maximum legal limit, but it still requires a great deal of movement of the stock suspension arms to obtain maximum travel. The Andy's front arms used on this RC10 widen the front end to within a 1/4 inch of

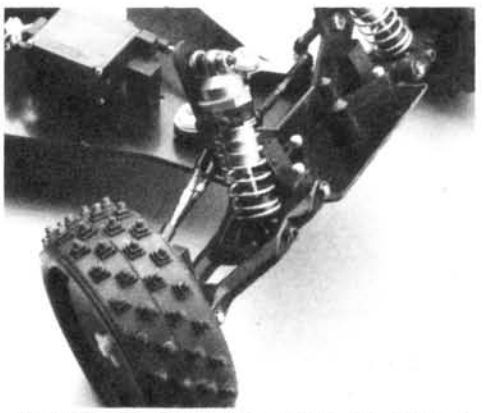
Parts Used	Part #
Trinity	
Joel Johnson motor	2011
Graphite chassis plate	8004
Graphite shock towers	8005
Motor heat sink	4043
Matched 7-cell SCE packs	5045
Team Losi	
Steering bellcranks	7009
Andy's R/C Products	
Front suspension arms	3400
Rear suspension arms	3402
Renegade Stage II body	3024
Tekin Electronics	
Pro speed control	ESC 300 PT
Battery charger	BC 100 S
Robinson Racing	
90 tooth spur	2190
14 to 20 tooth pinions	1114 to 1120
Team Pit Stop	
Differential kit	9040
Bud's Racing Products	
Horizontal wing mounts	5245
Mini bi-level wing	5237
Futaba	
Magnum PCM 1024	1870
Mini high-speed servo	FP-S135S
Race Prep	
Pro connectors	724



Featuring the latest breakthrough in battery-charging technology, the Tekin BC100 S provided the Trinity matched 7-cell SCE packs with a superior charge. A Trinity SCR pack was also used for stock racing and as a warm-up pack to preserve the 1700s.



Supplying power to the redesigned Trinity Joel Johnson motor is the new Tekin ESC 300 PT TempFET speed controller.

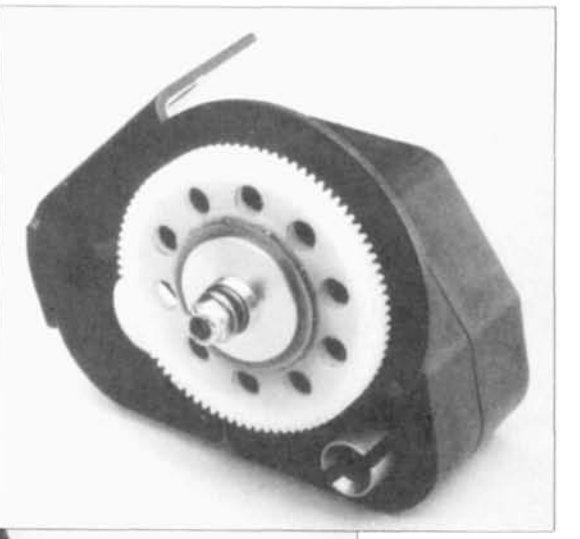


Not only do Andy's front A-arms widen the front end, they also allow for more suspension travel and, as a result, more stable handling.

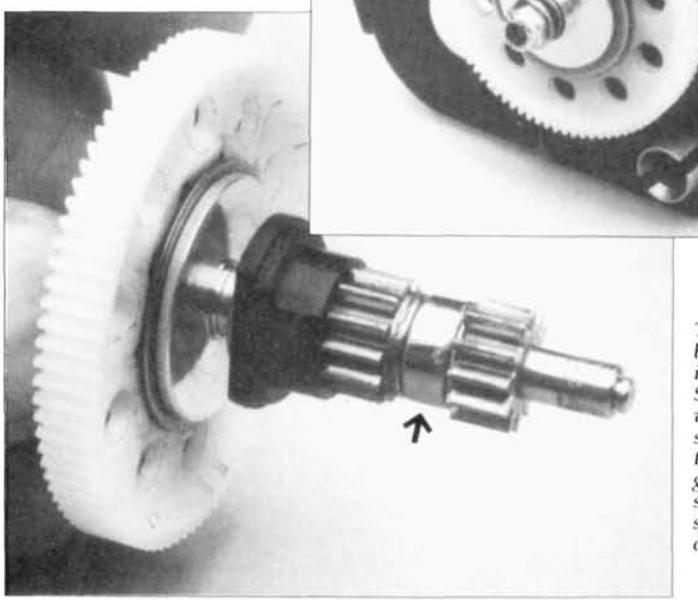
RC10 TORPEDO

the legal limit. The longer arms also provide more suspension travel without such a radical movement of the arm itself. A set of Andy's rear arms is also used, and these are made to the same dimensions as the stock rear arms, but they're *lighter*. I highly recommend that you use the front arms, and the rears, too, if your budget allows.

can be installed in the cap of the shock. These gaskets are cup-shaped rubber, and they leave a pocket of air above the gasket while preventing it from mixing with the oil below. This way, the air above the gasket can be compressed as the piston enters the oil chamber without mixing the air with the oil and affecting the dampening. Not a bad concept!



Sporting a Robinson Racing spur gear and black anodized motor-mountin plate, the assembled tranny is ready to be bolted to the chassis.



The new thrust bearing included in Team Pit Stop's Diff Rework kit, shown sandwiched between the two gears, allows very smooth and consistent operation of the differential.

To smooth out the bumps, the stock RC10 suspension is also one of the best in the business, but it does need a little attention. When a shock is compressed, a larger portion of the shaft to which the piston is connected enters the fluid reservoir. The shaft is therefore occupying more space inside the shock. The oil that the shaft displaces must have a place to go without leaking out of the shock, and this means that you must leave some air in the reservoir to prevent the shock from locking up (oil won't compress, so if there's no air in the shock, it will "lock" and won't move). But air in the shock will eventually find its way to the piston, and this is bad news, because it will make the dampening very inconsistent. To prevent this, a set of CRP* shock-pressure gaskets

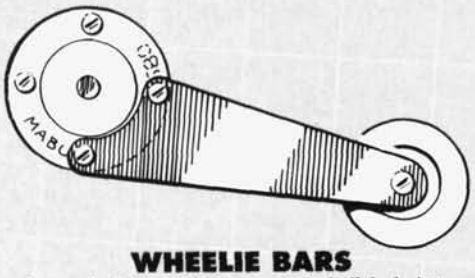
As for the oil itself, the synthetics seem to provide more consistent dampening. Changes in temperature caused by the weather or friction (during use) cause more radical changes in the viscosity of standard oils. The synthetics, on the other hand, are more resistant to temperature changes and, therefore, are more consistent.

There are a number of synthetic oils available, but the Team Losi* oils have an extra benefit. Part of tuning your car to any track is experimenting with different oils for the most efficient dampening. While changing oils, I sometimes forget what I had in the shock, or if the label falls of the bottle, I don't even know what I'm starting with. The Team Losi shock oil is

(Continued on page 87)

PIT TIPS

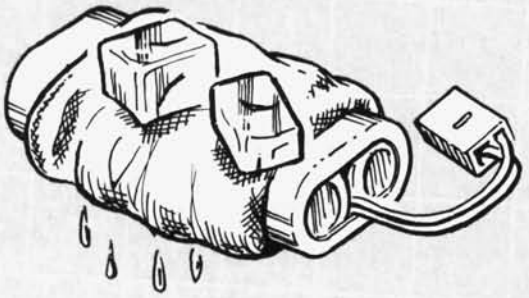
by JIM NEWMAN



WHEELIE BARS

"Big Bears do nice wheelies—until you snap the bed off the body!" says Tom. To prevent a repeat performance, he cut out these simple wheelie-bar brackets from sheet metal and bolted them to the motor. Any suitable wheels will work, but he managed to find some old Stomper wheels. Using existing hardware, these bars will also mount on CJ7s and Toyotas, too.

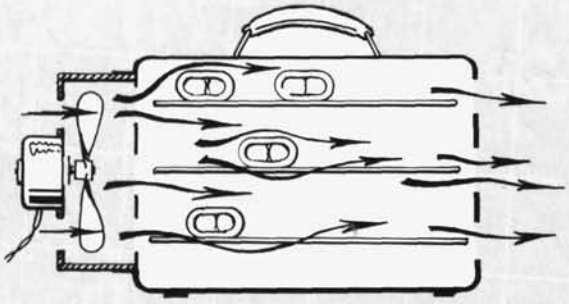
Tom Dussault, Agawam, MA



NI-CD COOLING

Here's a quick way of cooling Ni-Cds: Wrap the pack with a cold, moist cloth or paper towel so that the evaporation rapidly dissipates the heat. You could even rob the cooler for an ice cube or two and put them on the cloth as a source of ice water.

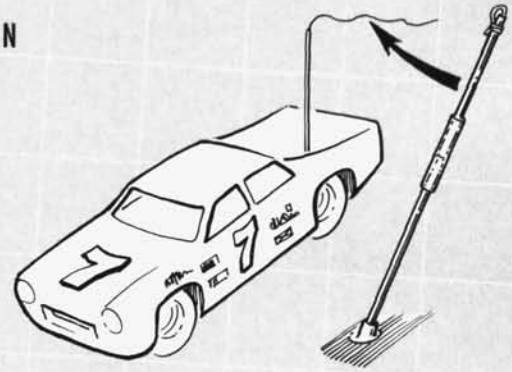
Chad Barnhart, Johnstown, PA



WIND TUNNEL NI-CD COOLING

Make yourself a wind tunnel and share it with your friends. This one is a converted toolbox with suitable slots in the ends. An old fan (a stove extractor fan would be great) mounted in a box provides the airflow, while the Ni-Cds rest on cut-down barbecue grills supported on wooden blocks to promote air circulation. With a simple slide-in adaptor plate, you could rapidly substitute 12V or 110V fans, depending on the power available at the track.

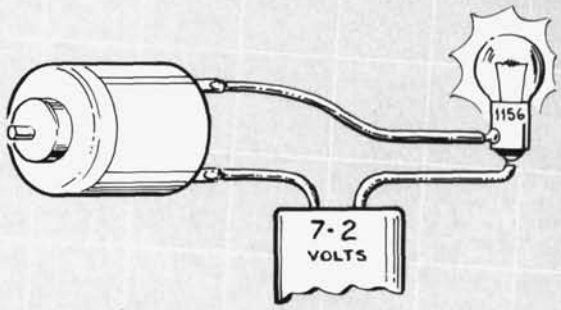
Mike Molinar, Rexdale, Ontario, Canada



INCREASED RADIO RANGE

Here's a suggestion for the piece of antenna wire that trails from the top of the antenna tube: Using a plastic sleeve over the outer diameter, this car owner extended the plastic tube so that the extra wire is vertical and secured at the top in the usual way. He now claims a significant increase in radio range. Do *not* cut off the excess wire!

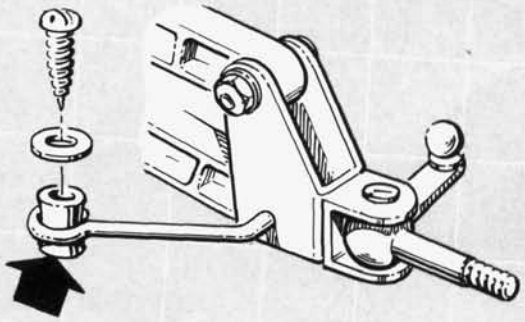
Bryan Bates, Airdrie, Alberta, Canada



VOLTAGE DROPPER

Use the No. 1156 automobile light bulb that's often used for discharging battery packs. With a system of leads and crocodile clips or plugs, you can put this bulb in circuit (series) and use your stock 7.2V Ni-Cd pack to break-in your motor at a lower voltage: lower rpm *without* the expense of buying flashlight D-cells.

Cory Herbst, St. Louis, MI



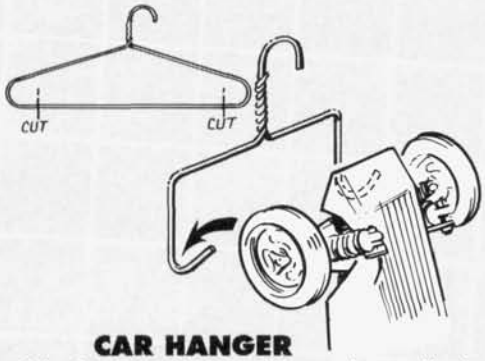
NO-SLOP SUSPENSION

Check your Frog, Suburu Brat, Monster Beetle, Blackfoot, etc. Replace the brass-tube bushing with a 3/17-inch length of silicone-rubber, model-plane, fuel tube. This tightens the suspension, minimizes wear at that point and improves handling.

Brian Scott Wood, Westland, MI

(Continued on page 30)

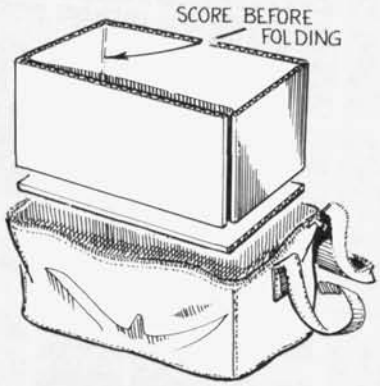
PIT TIPS



CAR HANGER

Cars occupy valuable bench space, so cut a wire coat hanger as shown, and bend two hooks at the cut ends. These hooks should be far enough apart to engage the front or rear suspension arms. (Do *not* engage the drive shafts!) The hanger can hook over a nail, or the wooden trim around your workshop wall.

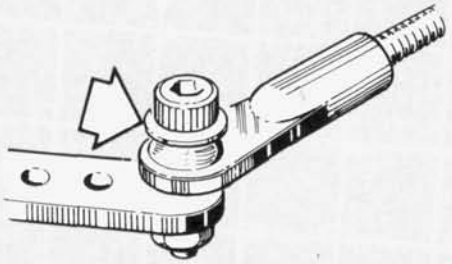
Thies Schrader, Ulset, Norway



CARRYING CASE

Rather than spend a lot on a custom carrying case, Kev picked up an inexpensive rectangular bag and lined its sides, ends and bottom with heavy cardboard—probably using duct tape to keep it all together. Check your local TV store for those heavy tri-wall corrugated cardboard boxes, as they're ideal for this job.

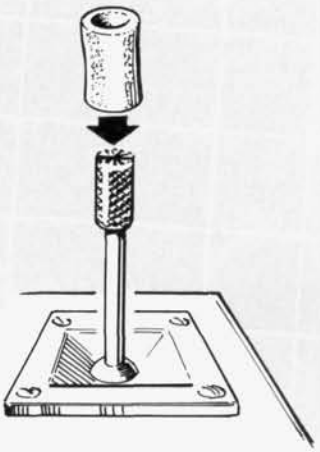
Kev Shafer, N. Canton, OH



BALL-JOINT SAFETY

Straight from aviation, here's a safety tip that prevents a ball joint from totally disconnecting if it pops loose. Place a washer on each side of the ball joint, making sure that the washers are slightly larger than the hole in the ball joint so that they can't pull through.

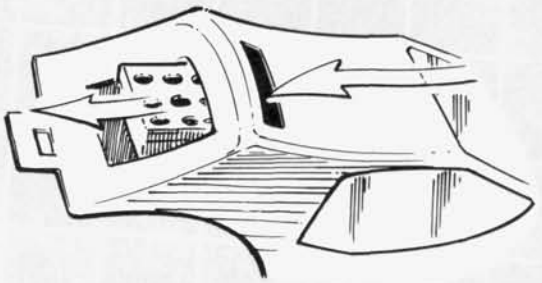
William R. Paone, Aurora, CO



STICK GRIP COMFORT

If you use a two-stick controller, do you find the sharp knurling on the knobs a little uncomfortable? For greater comfort, force pieces of surgical rubber tube over each knob. For the larger sizes of tube, talk to your R/C glider friends, or see your hobby store.

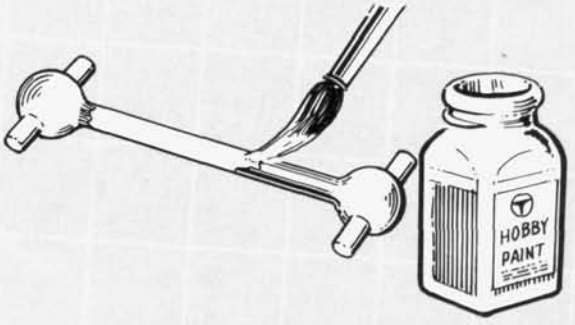
Jason Highsmith, Skaneateles, NY



SPEED-CONTROLLER COOLING

There's a raised lip on the roof of the Optima, and for additional cooling, Jim cut out the front of this lip to form an air scoop. I suggest that you also try gluing in a plastic deflector to direct the airflow downward onto the unit.

Jim Constatin, Bay City, TX



HIGH-VISIBILITY DOGBONES

Paint your dogbones (even steering links) a bright color, e.g., yellow, white, or orange, so that if they *do* fall off, you'll have a reasonable chance of seeing them in the dirt. For a neat method of retaining your car's dogbones, check "Pit Tips" in the June '88 issue.

Robert Barrosa, South Gate, CA

Radio Control Car Action will give a free one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Pit Tips." Send rough sketch to Jim Newman, c/o **Radio Control Car Action,** 251 Danbury Rd., Wilton, CT 06897. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we cannot acknowledge each one, nor can we return unused material.

KYOSHO FORMULA 1 RACERS

TRACK REPORT

by WALLY DAVID

AS YOU ROCKET down the straightaway and jockey for position entering the first turn, your F-1 Grand Prix racer responds to the slightest flick of the steering wheel. The TV camera gets a close-up shot of your front double A-arm suspension working to handle the bumps in the track surface. Your turbo-charged engine is pumping out massive amounts of horsepower to carry you at more than twice the speed and acceleration of that which you're used to for daily transportation.

And as the checkered flag falls, you've just beaten the best drivers in the world. That giant trophy, the bottle of champagne and the kiss from the gorgeous trophy

THE

girl, make you the envy of your fellow racers and the millions of people watching on television.

Suddenly, you realize that you were daydreaming while staring at your new 1/18-scale Formula 1 Racer made by Kyosho*. It's very easy for this to happen because of the stunning realism and attention to scale detail that Kyosho has been able to achieve.

THE KIT: The F-1 Racer is a truly unique R/C car. The fully articulated front and rear independent suspensions are very effective, while at the same time, being incredibly realistic.

The front end has a double A-arm suspension that connects the steering blocks to the front bulkhead. A small metal pull-rod runs from the steering block to a small friction-spring shock absorber. Black wheels and sponge slicks keep the front end glued to the track.

The rear end also has an upper and lower A-arm on each side, as well as a small friction-spring shock. The gear case houses a bevel-gear differential that turns tiny aluminum swing shafts (dogbones). The swing shafts turn the rear wheel shafts, to which are connected the black rear wheels and

UNSER AND MEARS ARE READY FOR '89

AL UNSER JR. FINISHED 2nd in points for last year's CART/PPG Indy Car Championship, winning races at Long Beach, Toronto, The Meadowlands, and Tamiami Park (all road-courses). In the Valvoline March-Chevrolet owned by Rick Galles, Unser

PHOTO BY STEVE POND

Jr. scored more points than all the other drivers on roadcourses, but he wasn't even in the top ten on ovals. He was 3rd in the number of laps led, which was quite an achievement, considering he led laps at only two ovals all year long. Little Al didn't capture a pole all year, which shows that he got the job done when it counted most—in the race.

Rick Mears, in the Pennzoil Penske-Chevrolet, owned by Roger Penske, was the 1988 Indy 500 winner. The oval master finished 4th in points and 2nd in laps led. Winning Indy and the race on the Milwaukee Mile, grabbing four poles, and finishing every race but one made for a very consistent year. With better luck during mid-season, Mears might have won the championship.

After the strong showing of both drivers and cars in 1988, there's no reason to think that they won't be near the top at the end of the 1989 CART/PPG Indy Car season. ■

FED FOR SPEED

FORMULA 1

KYOSHO

FORMULA-1 RACERS

Type ..... On-road
Scale 1/18
Sug. Retail Price $110

DIMENSIONS:
Overall Length ..... 9.75 inches
Width ..... 4.75 inches
Height ..... 2.5 inches
Wheelbase ..... 5.875 inches
Front Track ..... 4.00 inches
Rear Track ..... 4.25 inches

WEIGHT:
Gross (w/bat.) ..... 13 ounces

BODY:
Type ..... Formula One Lotus Honda 99T (Pennzoil), Williams Honda FW-11b (Valvoline) McLaren also available
Material ..... ABS plastic

CHASSIS:
Type ..... Flat pan
Material ..... Fiberglass

DRIVE TRAIN:
Type (pri./sec ..... Pinion/Spur
Differential ..... Planetary/gear type
Bearings/bushings ..... Nylon

SUSPENSION:
Type (f/r) ..... Independent double wishbone
Dampening (f/r) ..... Coil-over friction

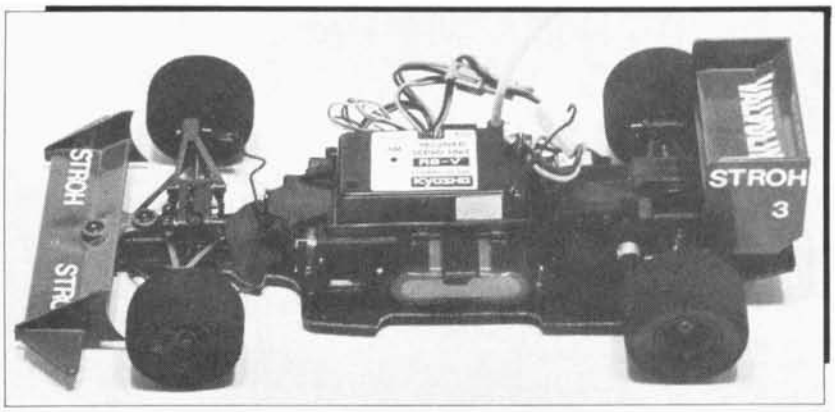
WHEELS:
Front: Type ..... Nylon
Dimensions (DxW ..... .75x.75 inch
Rear: Type ..... Nylon
Dimensions (DxW ..... .75x1 inch

TIRES:
Front ..... Sponge
Rear ..... Sponge

ELECTRICS:
Motor ..... LeMans DM-20
Battery Req'd. 6-cell, 270mAh
Speed Controller ..... Electronic-receiver/speed controller unit (not included)

OPTIONS AS TESTED:
Kyosho Pulsar 2000 Radio with Mini R/S Receiver/Speed Controller Unit.

COMMENTS:
Superb scale detail for an R/C car. The bodies are molded differently; they're not just the same body with different stickers. Although they're slow, these cars handle well. The speed problem could be taken care of with a hotter motor, e.g., the one found in Tamtech cars. If raced in small area, they make for some exciting action.



It's a tight fit, but all of the electrical components fit underneath the sleek Formula-1 body.

sponge slicks. By choosing between two counter-gear positions and changing the two pinion gears supplied, four ratios are available. These ratios allow you to choose between long running time or maximum speed.

The front and rear ends are bolted to a composite chassis, as are the front and rear wings. A finely detailed, lightweight plastic body with a roll bar, cooling scoops, and twin side-view mirrors finish the kit.

The 23-page, 39-step instruction manual is a real blessing to modelers of any age and experience. It consists mostly of clearly drawn illustrations. Kyosho seems to understand that a picture, or drawing, is worth a thousand words. Written descriptions are only used to clarify some of the difficult sections. There are even drawings of little guys wearing a Kyosho hat and T-shirt to point out areas of special importance. A complete list of all parts in the kit (as well as optional hop-up parts) is included. It would be nice if the convenient legend of the parts needed in each step were a little closer to actual size. Otherwise, you couldn't ask for a better set of instructions.

The Kyosho Pulsar 2000 Radio. The Mini R/S unit is a receiver and electronic speed controller all in one, with a mini servo attached.

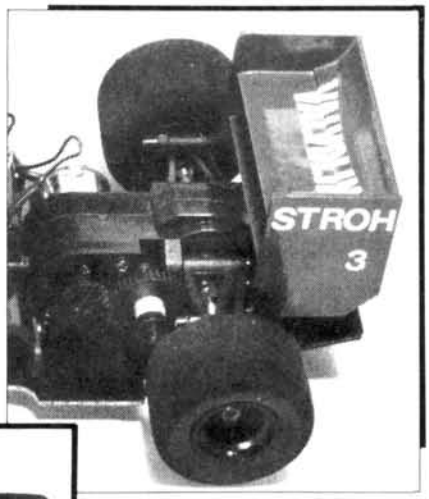
ASSEMBLY: Construction starts with the assembly of the differential gear and the gearbox. Owing to the large number of very tiny screws and bevel gears, this is probably the most difficult part.

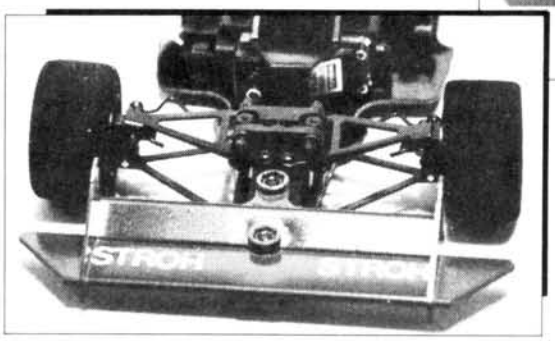
Construction continues with the installation of the DM-20 LeMans motor and the rear suspension. These steps progress without problems. An interesting technique is used to hold the suspension-arm hinge shafts in place. Instead of the commonly used E-clips (which would have to have been microscopic in this case), Kyosho used plastic shaft stoppers. They do the same thing as E-clips, but with a stopper-holder tool, they're easier to install and remove. When complete, the rear-end unit is attached to the flat, composite chassis.

The front end is next. This section went together without a hitch. The instructions make no mention of lubricating the hinge shafts in the front or rear suspension. I recommend a very light coating of the moly grease, which is supplied for use in the gearbox. Just a little will enable the suspension to work more smoothly. When the front end is complete, it's bolted to the chassis. At this point, you must install your radio system. Because of the minute size of the F-1 racer, you'll need a very small radio. It's no coincidence that Kyosho's Pulsar Pro 2000 with Mini R/S Set is

perfect for this application. The Pro 2000 is a pistol-grip radio with a steering wheel, throttle and steering trim levers, and servo-reverse (for use with other cars). The Mini R/S Set is a combination receiver and electronic speed-control unit, and its tiny size allows it to be installed in the plastic radio box, along with the mini steering servo. Make sure that you set the steering trim lever to neutral before installing the servo horn, or you won't be able to get the car to turn properly.

The final assembly steps cover installing the tie-rods, the wheels and tires, and finishing the body. There are three F-1 Racer kits available from Kyosho: the McLaren MP4/3 Tag Turbo, the Williams Honda FW-11B, and the Lotus Honda 99T. These aren't just the same cars with different decal sheets; each body is shaped completely differently. The roll bars, side-view mirrors, side pods and air scoops are all unique.





Above: The rear end shows the gearbox with pinion and spur gear. Note the realistic rear wing. Left: The front end of the car features a double-wishbone independent suspension. It looks like it belongs on a full-scale formula car.

As a big Indy car fan, I asked my trusty body man, Bill Henning, of Henning Scale Models in Lansdale, PA, to come up with the cars of our two favorite drivers. Mine was Al Unser Jr.'s Valvoline March-Chevrolet, while Bill chose Rick Mears' Pennzoil Penske-Chevrolet. Bill used Testors* paint and Pactra* pinstripe tape, along with Autographics* decals to detail the cars.

Power for the F-1 racer is a 7.2V 270mAh square battery pack. Kyosho makes a pack, although the Tamiya* Tamtech battery pack also works well. While Kyosho and Tamiya both make chargers for these batteries, I chose to use my Tekin* BC100 adjustable-amp charger. With the proper adapter (available at your hobby dealer), any adjustable charger can be used at a rate of 2 amps for about 15 minutes, or until the pack gets slightly warm. A peak charger, such as the BC100, shuts off when the pack has reached the proper charge.

PERFORMANCE: After installing the battery packs and attaching the bodies, it was off to a nearby parking lot for a test drive of our F-1/Indy-car hybrids. Owing to the smallness of the cars, a relatively smooth surface is needed. To the 1/18-scale car, hitting a small pebble is like running into a boulder with a full-size car.

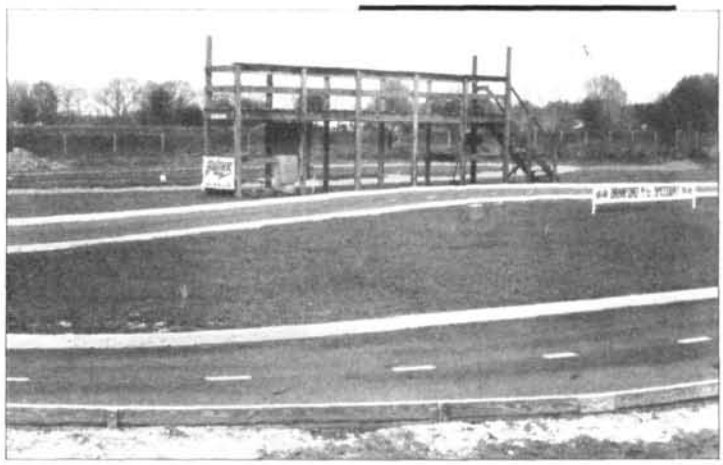
When we started the cars and ran them around for a while, two things became clear: The cars handled wonderfully, and they were very slow. Even with the cars geared at their fastest, they were consumed by the vast asphalt ocean.

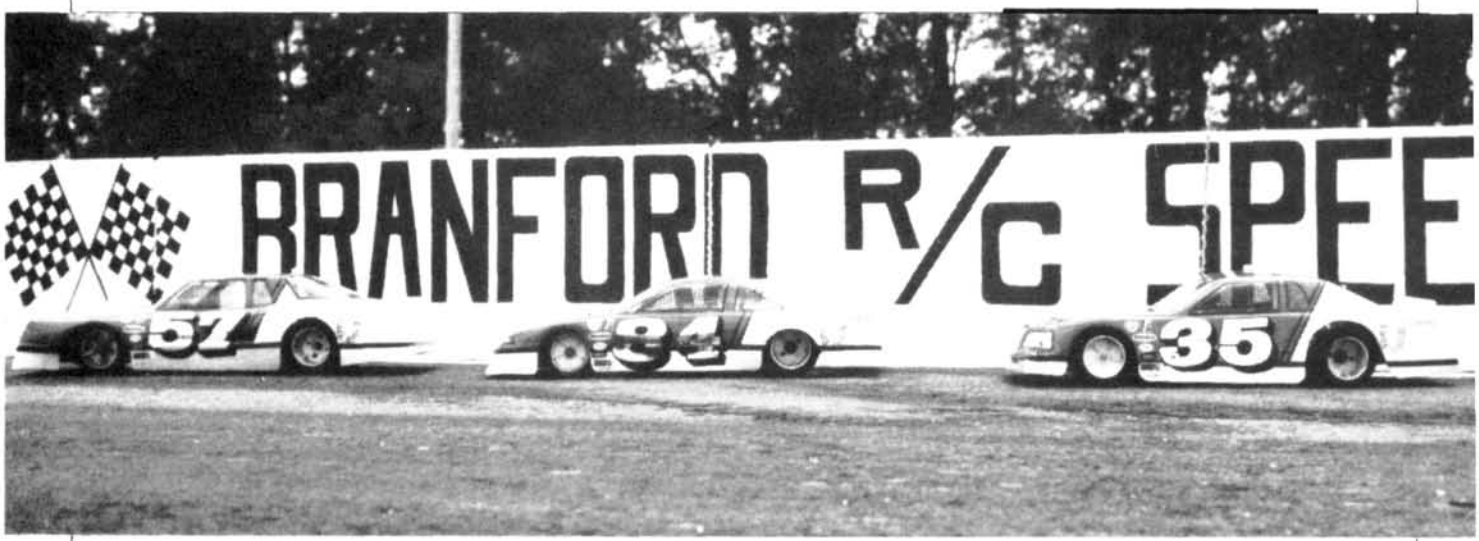
The key to making these cars interesting to drive is keeping the track area small. They were designed to be raced in tight spaces. With this in mind, the Kyosho F-1 Racers are fun little cars. With an optional ball- bearing set and the LeMans DMC20BB ball-bearing motor, you'll be able to turn up the turbo boost and get more speed out of these fantastically detailed, scale models.

**Here are the names of the manufacturers mentioned in this article:*
***Kyosho,** distributed by Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61820.*
***Testor Corporation,** 620 Buckbee St., Rockford, IL 61101.*
***Pactra,** 410 N. Michigan Ave., Rm. 1280, Chicago, IL 60611.*
***Autographics of California,** 7401 White Lane #1, Bakersfield, CA 93309.*
***MRC/Tamiya,** 200 Carter Dr., P.O. Box 267, Edison, NJ 08818.*
***Tekin,** 970 Negocio, San Clemente, CA 92672.* ■

HOT TRACKS

Welcome to "Hot Tracks." Each month, we'll choose an outstanding track to feature in this column. To qualify, send in some high-quality, black-and-white photos of your track, along with a description (approximately 500 words), outlining why your track should be chosen. Send your entries to Hot Tracks, Radio Control Car Action, 251 Danbury Road, Wilton, CT 06897.





Branford R/C Speedway

THE TRACK SITE AT Branford R/C Speedway, located in Branford, FL, actually features two separate layouts. The 10-foot-wide asphalt tri-oval is 288 feet long, and the turns at the end of the long straight are banked 16 degrees, while the tri-oval portion of the track is banked at 8 degrees. Tuffy Carrigg holds the track record with a lap speed of 29.25mph.

The other track is a clay tri-oval with an off-road course running through the infield. The dirt oval isn't banked, but it's longer than the paved one. The two tracks share a single driver's stand that's 7 1/2 feet tall and 30 feet long—a good way to save money when building more than one track at a single site. There are also 12 covered workbenches for racers to pit, and owner Scott Peterson says he plans to build more.

The Branford R/C Speedway is located on Route 2, Box 298, Branford, FL, and the phone number is (904) 935-0758. If you're ever in the area, check out the facilities. It looks like a good place to go fast on dirt or asphalt. ■

READERS' RIDES

Welcome to "Readers' Rides"! We continually receive photos of readers' latest projects, so we've decided to start featuring some of the more innovative stuff to give all our readers a glimpse of these neat cars and trucks, etc. So here we go! If you want to be part of this new feature, send us a nice color photo of your project with a brief description, and we'll show it to the Ayatollah of Radio Controlla at the next editorial meeting to see if he'll publish it!

If we publish your photo, we'll give you a one-year subscription to RCCA, or extend your existing one, and you'll even be eligible for our "Readers' Rides Car of the Year Contest" in the fall of '89. Send your photos to Readers' Rides, R/C Car Action Magazine, 251 Danbury Road, Wilton, CT 06897.

Jim Graham from Ontario, NY, sends us this picture of his imaginative ghost-bustin' Optima Mid. The Optima features a set of ball bearings, an adjustable tie-rod set, a stabilizer set and Pro-Line tires. The body was original equipment on the Tamiya Sand Scorcher, which was slimed by Jim himself.

This sharp-looking Bruiser comes to us from Wade Stoddard of St. Johns, AZ. Wade's Bruiser is essentially stock, with a lot of TLC in the finishing department. The entire undercarriage is polished, and the sharp paint job was done with acrylic enamels in 1986 Toyota Blue, 1977 Porsche Lime Green and Magenta, and 1977 Corvette Yellow. Custom visor is also à la Stoddard.

Mike Murphree of Anniston, AL, sent us this photo of his "converted-for-road-racing RC10." Armed with information from our "On-Road RC10" article in the March '89 issue of *Car Action,* Mike tells us he can even fend off some of the pan cars at the Webster Chapel & Fleming Raceway. One problem Mike does have though, is that his wife doesn't share his enthusiasm for R/C racing. Can you imagine such a thing?!

At first glance, you'd think that these photos were from the heart of Motor City, but these were submitted from our Far Eastern friends in Kyoto, Japan. Masanori Kinoshita tells us that he and his friends enjoy the sports cars and stock cars that are so popular in the USA. (Masanori's car is the sharp-looking No. 98 blue Cobra.) Aside from his obvious interest in 1/10-scale cars, Masanori is also interested in 1/4-scale racing and would like to visit the U.S. for the next 1/4-scale feature race.

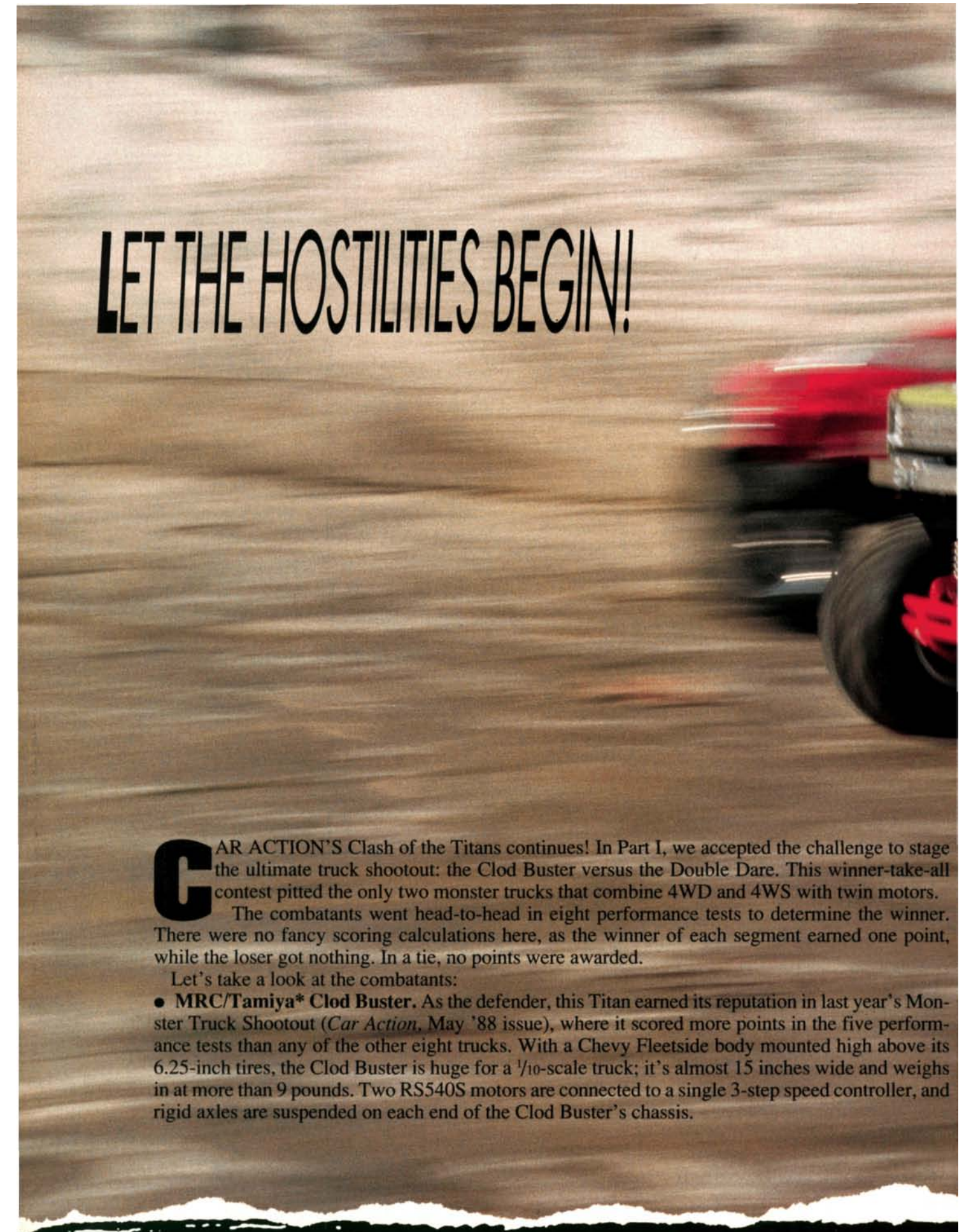
With the rise in popularity of monster-truck racing, an increasing number of the photos we receive are in this category. This sharp-looking conversion truck built by John Rubke of San Rafael, CA, has a JG monster-truck conversion as well as a host of other high-performance parts that should make this one a stout competitor.

This scratch-built dragster is the handiwork of Larry Kumm from Freemont, NE. The body is the classic '63 Corvette with hand-painted murals. To complement the beautiful graphics, there's a set of brightly polished aluminum wheels. Larry's talents also include scratch-building the differential.

The impeccable finish on this Avante is the work of Mohd Yusoff Haji Said from Singapore. As well as giving it an exceptional paint job, Mohd also modified his Avante with a Tekin Pro speed controller, a Sanwa radio system, a Tamiya Dynatech motor, and the Tamiya carbon-fiber and titanium accessories. The car has won a few races and a "Concourse de Elegance" prize. (Would you race with a body as sharp as that?) Great paintin', dude!

This radical machine goes by the name of "No Sweat II" and is the work of Brian Mundy from Oakville, Ontario, Canada. It started as a Tamiya German Leopard R/C tank kit. The chassis was given a once-over for appearance and then equipped with a Technigold motor. With a final drive ratio of 26:1, Brian assures us that this thing has plenty of pulling power as well as speed.

LET THE HOSTILITIES BEGIN!



CAR ACTION'S Clash of the Titans continues! In Part I, we accepted the challenge to stage the ultimate truck shootout: the Clod Buster versus the Double Dare. This winner-take-all contest pitted the only two monster trucks that combine 4WD and 4WS with twin motors.

The combatants went head-to-head in eight performance tests to determine the winner. There were no fancy scoring calculations here, as the winner of each segment earned one point, while the loser got nothing. In a tie, no points were awarded.

Let's take a look at the combatants:

- **MRC/Tamiya* Clod Buster.** As the defender, this Titan earned its reputation in last year's Monster Truck Shootout (*Car Action*, May '88 issue), where it scored more points in the five performance tests than any of the other eight trucks. With a Chevy Fleetside body mounted high above its 6.25-inch tires, the Clod Buster is huge for a 1/10-scale truck; it's almost 15 inches wide and weighs in at more than 9 pounds. Two RS540S motors are connected to a single 3-step speed controller, and rigid axles are suspended on each end of the Clod Buster's chassis.

CLASH of the TITANS

PART II

by RICH HEMSTREET

• **Kyosho's* new Double Dare.** Weighing in at a light 6 pounds, 12 ounces, the challenger seemed ready to leave its competitor behind in a cloud of dust. Fully independent suspension is found on both ends of the Double Dare; the stock LeMans 05 motors provide plenty of power to the 2.875-inch wide tires; and a polycarbonate Nissan pickup body is mounted high above the 5.5-inch tires.

The only modification made to the trucks was the addition of full ball-bearing sets. Kyosho bearings were installed in the Double Dare during assembly, and the Clod Buster was outfitted with a set of ball bearings from Boca Bearing*. Boca has ball bearings available for all monster trucks and R/C cars, and they're important for monster trucks—at least, in the gearboxes.

Enough of the preliminaries: Let the hostilities begin!

Sled Pull

In the original Monster Truck Shootout, the Clod Buster came out on top with a pull of more than 40 pounds. Generally speaking, a heavier vehicle can pull a heavier sled. As it was hooked to the

pulling sled, the lighter Double Dare was at a 2-pound disadvantage. Its only chance was for its hotter motors to get the momentum going before the weight transferred too far up the sled.

Starting with only 10 pounds in the Aristo-Craft* pulling sled's bucket, the Double Dare was hooked up to go first. After a slight hesitation, the Dare got under way, only to grind to a halt 100 inches down the course—nowhere *near* a full pull. Three more attempts couldn't improve the results.

Next, the bright green Clod was hooked up to the sled; the signal was given and off went the truck and sled. The Clod Buster not only made a full pull at 10 pounds, but it also kept towing the sled behind it as easily as if it were an empty boat trailer.

Score: CLOD BUSTER 1; DOUBLE DARE 0

Maneuverability

Here, the Titans simply went in circles, left and right, in forward and reverse. Each circle was measured; all four

for each truck were added together and then divided to determine the average turning diameter of each truck.

Once again, the challenger went first. The Double Dare averaged 61.25-inch turning diameters, but the Clod Buster couldn't top the nimble challenger, as it averaged 99.5 inch turning diameters.

Score: CLOD BUSTER 1; DOUBLE DARE 1

No surprises, so far. The next few tests emphasized speed and handling, and with the score tied, the Clod Buster could be in trouble!

Acceleration

Its light weight and hotter motors were good signs for the Double Dare, and the short 25-foot drag strip should have worked against the Clod, too.

Once again, the Double Dare was up first. Several runs were attempted, and the quickest time recorded was 2.16 seconds. While the Dare was quick going across the finish line, it did seem to take a little time to "get on the pipe"—almost as if it had turbo lag!

Next came the heavyweight, and on its first run, the Clod Buster tied the 2.16-second mark. While the Clod duplicated that effort on a few subsequent runs, it couldn't do any better. The Clash of the Titans produced its first tie, and no points were awarded!

Score: CLOD BUSTER 1; DOUBLE DARE 1

Handling

Off to the track went the Titans, where the quickest lap time would win. The fastest lap turned in by the Double Dare was 19.78 seconds, but it was a challenge to squeeze out a complete lap for timing, because the challenger kept rolling over in the turns. The corner marshalls sometimes had to right the

CLASH OF THE TITANS

DOUBLE DARE	CLOD BUSTER
SLED PULL	
10 pounds, 100 inches	29 pounds, full pull
MANEUVERABILITY	
61.25-inch turning diameter	99.5-inch turning diameter
ACCELERATION (25 feet)	
2.16 seconds	2.16 seconds
HANDLING	
19.78 seconds	20.29 seconds
TOP SPEED	
10.33mph	9.16mph
DURATION	
4 minutes, 18 seconds	8 minutes, 33 seconds
HILL CLIMB	
25 feet	27 feet
CAR CRUSHING (25 feet/ 5 cars)	
2.57 seconds	2.25 seconds

truck two or three times in a single lap! The Double Dare is a definite candidate for a monster truck rollover antennas—as soon as somebody makes them!

After the Clod Buster's first lap, however, it was obvious the defending Titan was in trouble. The truck could be run full tilt, lap after lap without a corner marshall having to move a muscle, but the fastest time I could squeeze out of the Clod was 20.29 seconds, which was more than half a second behind the challenger.

Score: CLOD BUSTER 1; DOUBLE DARE 2

Top Speed

The land-speed records have nothing to fear from the Monster Truck contingent. Neither of these Titans can be called speedy, but the Double Dare did make the high-speed runs exciting. It was almost impossible to keep it on the track at top speed. I tried to dial-out the steering sensitivity at the transmitter, and I almost flattened my wife in the process; she leaped over the top of the truck as I tried to steer the beast back onto the track! (Of course, I never did let off the throttle!) Finally, by dialing-in lots of toe-in (both front and rear) and constantly countering its attempt to swerve off course, the Dare posted a top speed of 10.33mph.

The Clod made run after run and never threatened to go off course, but the most I could coax out of it was 9.16mph.

Score: CLOD BUSTER 1; DOUBLE DARE 3

Because the two Titans had already tied in one test, at this stage, the Double Dare was only one point away from winning the Clash of the Titans.

Duration

The Double Dare had victory waiting only one point away. Would this be the event that put the Dare over the top? Would its light weight and smaller tires offset the increased drain on its hotter motors?

The duration events were mostly run at top speed on a large smooth surface. First up was the challenger with a time of 4 minutes, 18 seconds before the batteries dumped. Two more runs netted similar results that were approximately 10 seconds shorter.

TAMIYA

CLOD BUSTER

Type ..... Monster truck
Scale 1/10
Sug. Retail Price $354.95

DIMENSIONS:
Overall Length ..... 18.75 inches
Width ..... 14.875 inches
Height ..... 13.5 inches
Wheelbase ..... 10.75 inches
Front Track ..... 10.625 inches
Rear Track ..... 10.625 inches

WEIGHT:
Gross (w/bat.) ..... 9 pounds, 8 ounces

BODY:
Type ..... Chevy Fleetside pickup
Material ..... Injection-molded plastic

CHASSIS:
Type ..... Bathtub
Material ..... ABS plastic

DRIVE TRAIN:
Type (pri./sec.) ..... Direct spur gear (front and rear)
Differential ..... Bevel gear
Bearings/bushings ..... Plastic bushings

SUSPENSION:
Type (f/r) ..... Rigid axle
Dampening (f/r) ..... Twin coil springs

WHEELS:
Type (f/r) ..... Plastic
Dimensions (DxW) (f/r) ... 2 7/8x3 7/8 inches

TIRES:
Type (f/r) ..... Terra
Dimensions (DxW) (f/r) ..... 6.25x4.25 inches

ELECTRICS:
Motor ..... Two RS-540S
Battery Req'd ..... 7.2V flat pack
Speed Controller ..... 3-step with remote resistor

OPTIONS AS TESTED:
Boca ball bearings, Futaba S-28 servos and mini receiver

COMMENTS:
The Clod Buster was a consistent performer. Pulling a heavy load is easy with this truck. The Clod's car-crushing performance should quickly scatter any group of buggies that sees it approaching. Tamiya still has a winner in its monster-truck lineup.

The Clod Buster was then plugged in and the stopwatch started. As in the rest of the events, the Clod's power/economy switch was left on the "power" setting. Eight minutes and 33 seconds later, the Clod Buster ground to a halt, winning its second point.

Score: CLOD BUSTER 2; DOUBLE DARE 3

Hill Climb

The hills were chosen ahead of time. My only problem was that I'd miscalculated the ability of these trucks to make short work of steep inclines. The event was supposed to have been decided by which truck could climb the steepest hill. Instead, I had to locate a hill that *neither* Titan could conquer and award one point to whichever truck could make it the farthest up the hill.

Once again, the Double Dare led off. At the 25-foot mark, its front tires lost traction, and it took a sharp left turn. After traversing the hill at the 25-foot level for a few feet, I tried to turn back up the hill. Turning the wheels caused the truck to lose its balance and barrel-roll down the hill all the way to the bottom. Several more attempts also ended at the 25-foot mark with the sharp left turn. Even counter-steering to the right didn't prevent the left turn, and every run ended in a barrel-roll.

The Clod Buster's first attempt also ended at the 25-foot mark with a sharp left-hand turn followed by a traverse of the hill. When I tried to turn back up the face of the hill, the Clod continued to go in a straight line. Finally, I turned left and drove the truck back down the hill to try a second attempt. As I'd previously tried with the Double Dare, on the second run, I started to turn right at the 23-foot mark to overcome the sharp left 2 feet later. The Clod Buster responded by going straight up the hill to the 27-foot mark where it once again made a sharp left. Subsequent runs equalled the 27-foot level, but never topped it.

Score: CLOD BUSTER 3; DOUBLE DARE 3

Car Crushing

With the score tied, the Clash of the Ti-

KYOSHO

DOUBLE DARE

Type ..... Monster Truck
Scale 1/10
Sug. Retail Price $234.95

DIMENSIONS:
Overall Length ..... 17.5 inches
Width ..... 11.5 inches
Height ..... 11.25 inches
Wheelbase ..... 10.25 inches
Front Track ..... 8.5 inches
Rear Track ..... 8.5 inches

WEIGHT:
Gross (with bat.) ..... 6 pounds, 12 ounces

BODY:
Type ..... Nissan Hardbody pickup
Material ..... Polycarbonate

CHASSIS:
Type ..... Tub
Material ..... ABS Resin

DRIVE TRAIN:
Type ..... Direct spur gear (front and rear)
Differentials ..... Geared
Bearings/bushings ..... Plastic bushings

SUSPENSION:
Type (f/r) ..... Upper and lower arms
Dampening (f/r) ..... Twin friction shocks

WHEELS:
Type (f/r) ..... Chrome plastic mags
Dimensions (DxW) (f/r) .... 2.4375x2.875 inches

TIRES:
Type (f/r) ..... Terra
Dimension (DxW) (f/r) ..... 5.5x2.875 inches

ELECTRICS:
Motor ..... Two stock LeMans 05s
Battery Req'd. ..... 7.2V flat pack
Speed Controller ..... Kyosho heavy-duty rotary

OPTIONS AS TESTED:
Full ball-bearings, Futaba S-28 servos and mini receiver

COMMENTS:
The Double Dare was an inconsistent performer; it's quick to rollover when driven hard. The motors are good performers, but the high-speed handling is poor. The steering knuckle breakage appears to have been corrected by Kyosho.

tans boiled down to a single event: car crushing. This event was held on a straight 25-foot course, with five 1/10-scale full-bodied R/C cars lined up side-by-side in the center of the course. From a standing start, each truck was supposed to accelerate toward the cars, go over their tops and continue on to the finish line. According to National Radio Control Truck Pull Association rules, only two of the truck's tires have to go across the cars, so you could have a legal run even if your two left or right tires never touched any of the cars. It seems fitting that car-crushing should be the final event: After all, the whole monster-truck craze can be traced back to Big Foot running over the tops of cars.

In this final event, the challenger once again went first. The first couple of runs saw the Double Dare knocked off course on hitting the cars. Neither run was legal, as the minimum two tires never touched the last two cars. To make a clean, legal run, it was necessary to back off the throttle slightly just before hitting the first car; then the throttle was nailed again as the Dare went over the roofs and headed for the finish line. This procedure netted the Double Dare an impressive 2.57-second run—only .41 seconds slower than the time both trucks recorded in the acceleration test over a course of the same length. Several other runs provided a mixed bag of results, including roll-overs and broken parts, but 2.57 seconds remained the Double Dare's best time.

The pressure was on for the Clod Buster to record a quick run. After one practice run, the timer was ready. I pulled the trigger and never let off until the truck had passed the finish line. The Clod Buster hit the cars squarely, ran over their tops, and leaped off the last car, heading for the finish line. The timer yelled out, "2.25 seconds!" The Clash of the Titans was over. The Clod Buster had defeated the Double Dare, 4-3.

Conclusion

The Clod Buster took several more passes over the cars to prove that the 2.25-second run wasn't a fluke, and these additional runs were all in the 2.27- to 2.38-second range. In each of the eight events, it was easy to get the Clod Buster to repeat its best time. "Consistent" is the best word to describe the Clod Buster. If the trucks had had only one or two shots at each event, the Clod Buster might have won 6-2 or 7-1. The only event where the Double Dare will consistently beat the Clod Buster is in maneuverability.

Several times during the Clash, the Double Dare needed repairs. The biggest problem was with broken steering knuckles: Two broke while attempting the car-crushing, and another broke for no apparent reason. Kyosho sent some new knuckles that they said would solve the problem, and so far, I haven't been able to break a new one—even when the Double Dare took on a parking brick at something close to top speed during a photo session.

The rotary speed control also had a problem, as it became more and more difficult to move the control dial from neutral to low speed. As well as the breakdown problem, Kyosho should address the Double Dare's instability. The truck is all too easy to flip, and this makes it next to impossible to control it at speed. When the steering linkage had been greased with petroleum jelly, it worked very well. With a little work, the Double Dare has the potential to become a dominant force in the monster-truck field, but the Clash has shown that the Tamiya Clod Buster will be difficult to beat in any stock-monster-truck shootout. Long live the Clod Buster!

**Here are the addresses of the companies mentioned in this article:*
MRC/Tamiya, *P.O. Box 267, Edison, NJ 08818.*
Kyosho; *distributed by Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61820.*
Boca Bearing Co., *10538 Lake Vista Circle, Boca Raton, FL 33498.*
Aristo-Craft/Polk's, *346 Bergen Ave., Jersey City, NJ 07304.* ■

THE RACER'S RACE OF 1989

Everyone wins

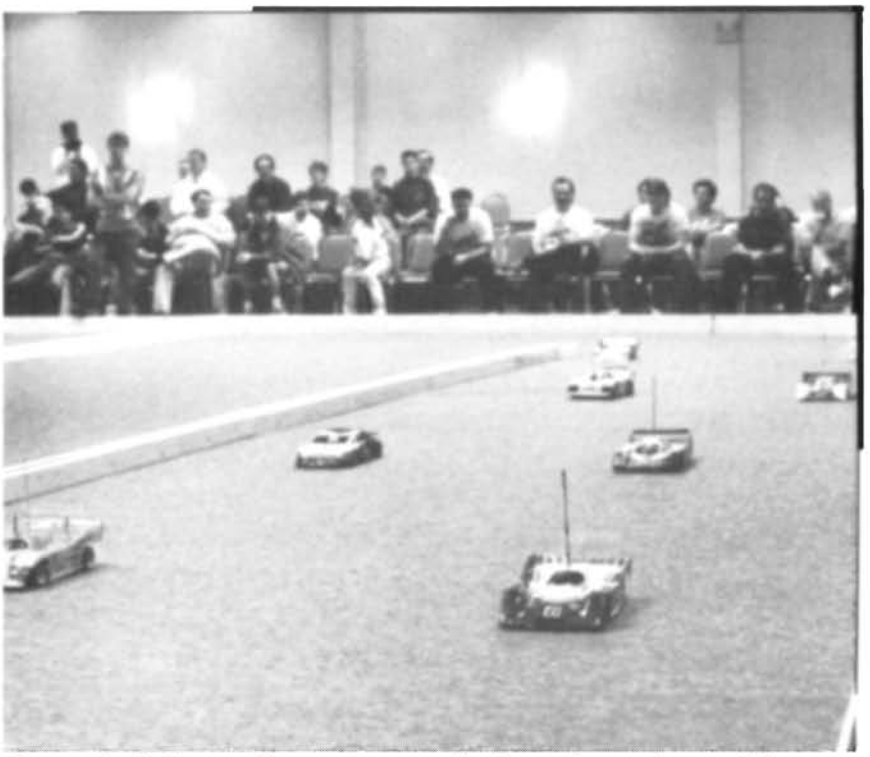
SPEEDWORKS

SPORTSMAN CUP

by STEVE POND

All the proud winners of the first Sportsman Cup race display the hardware they earned for their racing efforts. Mixed in with the winners are the World and National Championship drivers, as well as the race's organizers, who deserve credit for this successful event.

SINCE *R/C CAR ACTION* hit the newsstands in late 1985, we've covered many different R/C racing events, several of which have been sponsored by manufacturers. While the big-ticket races have provided manufacturers with a testing ground for new products and the opportunity to compete against other invitational or sponsored drivers around the country, they didn't offer much for the people who actually buy the product: you, the consumer. Sure, you could go race and you'd probably have a good time, but it can be pretty boring having your socks blown off by the highly skilled team drivers with their high-tech racing machines.



Interested onlookers watch as racers prepare for the starting gun for one of the many heats.

Sponsored by Trinity, the Speedworks Sportsman Cup race has broken that mold and laid the groundwork for the type of race that we hope will be an example for other manufacturers to follow. It's the first high-ticket race designed with the average enthusiast—the sportsman—in mind.

With four qualifies and a main, the race format itself isn't very different from any other on-road race, except that sponsored drivers were not allowed to enter the program. The experience of racing, however, is only a fraction of what's available to those in attendance at the Sportsman Cup.

Team drivers and representatives from several companies volunteered their time on Easter weekend to contribute to what they considered one of the most worthy causes in R/C racing: to provide useful information to the racers. Each of the representatives was present at the Sportsman Cup *not* to promote their companies' products or to see if they could make it to the A-Main, but to offer help to the racers in organized seminars. Trackside, they offered their assistance on a more personal level as they helped racers who had car problems or just wanted some pointers. Their presence was a testament to their dedication to the sport and their willingness to do what they could to make it more enjoyable for everyone.

During one of the many one-to-one seminars over the weekend, two-time World Champion Tony Neisinger took time out to offer Ed and Jason Harder some tuning and driving tips.

Those who deserve credit for making this race so enjoyable are Trinity owner and president, Ernie Provetti; team motor man Kevin Mauer; accomplished drivers Tony Neisinger, Chris Doseck, Bob Light, and Joe Lawrence; Bud Bartos of Bud's Racing Products; Rick Hohwart of Peak Performance Motors; Tyree Phillips from Team Losi; and Terry Rott of Composite-Craft. Another key player in the success of the event was ROAR

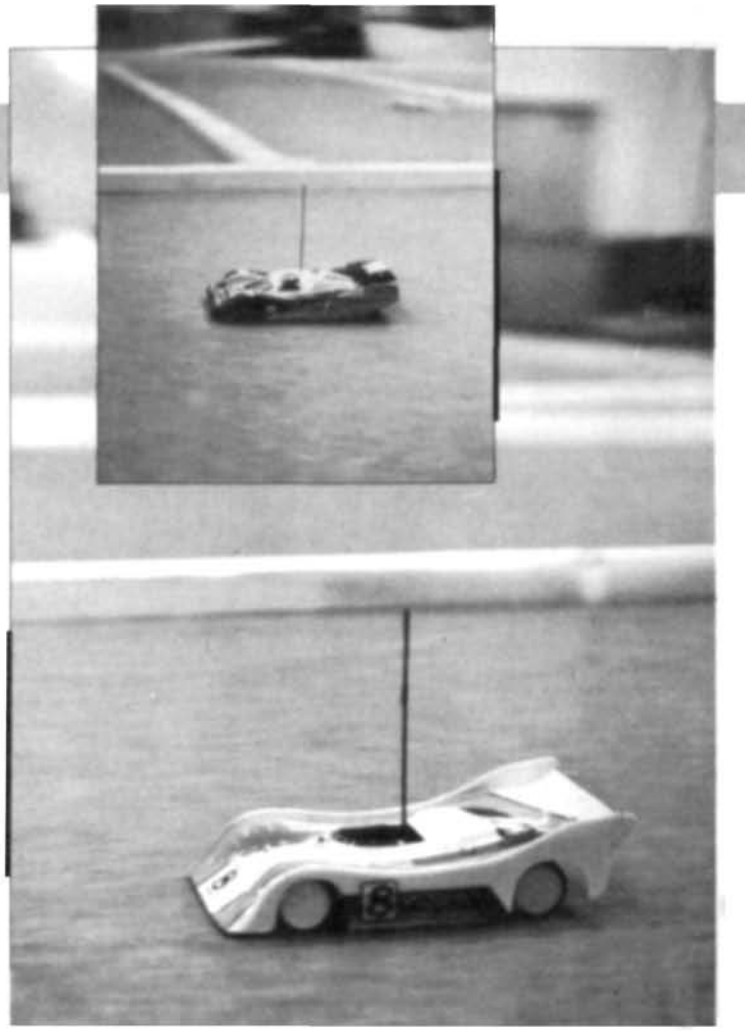
SPEEDWORKS SPORTSMAN CUP

1/12-SCALE A-MAIN

DRIVER	FINISH	QUAL.	HOMETOWN
Frank Calandra	1	1	Rome, NY
Chuck Sommers	2	4	Warren, MI
Conan Honeck	3	2	Napoleon, MI
Mike Baker	4	6	Brantford, Ontario
Steven Mancinelli	5	8	Mt. Clemens, MI
Wayne Penfold	6	3	St. Catherines, Ontario
Curt DeMars	7	7	Milford, MI
Keith Hamilton	8	10	Litchfield, MI
Dale Smith	9	9	New Baltimore, MI
Mike Pulfer	10	5	Tipp City, OH

1/10-SCALE A-MAIN

DRIVER	FINISH	QUAL.	HOMETOWN
Mike Pulfer	1	1	Tipp City, OH
Paul Morack	2	2	Roseville, MI
Joseph Fitzpatrick	3	10	Sterling Heights, MI
Chuck Sommers	4	3	Warren, MI
Ted McCarthy	5	7	Grand Rapids, MI
Dave Monegan	6	6	Stow, OH
Jeff Roberts	7	5	Brookville, OH
Chuck Pfahler	8	9	Cincinnati, OH
Steven Mancinelli	9	4	Mt. Clemens, MI
Rick Rottach	10	8	Birmingham, MI



Motor Seminars

Both the beginner and intermediate motor care and maintenance seminars focused on what racers can do to extend the life of their motors. Some tips included spraying down the motor after each run with a cleaning solvent to remove debris and carbon deposits from the innards. This is more critical with stock motors with fixed end bells that don't allow the commutator to be removed for maintenance. After spraying your motor, oiling the bushings or bearings is a must, because the cleaner will dissolve any lubricants. Be careful not to apply too much oil on the end-bell side of the motor, as it might find its way to the commutator and cause all kinds of problems.

The next recommended step is to clean the commutator with one of the popular commutator cleaning sticks. This will further remove the carbon deposits that affect your motor's performance. To prevent arcing, use an X-Acto blade or a small jewelers' screwdriver to remove deposits from the slots in the commutator. The edges left on the slots of the commutator are then burnished with a blunt tip, e.g., a ball-point pen. After running the motor with no load for approximately 3 minutes at 5V, you should have a tip-top motor ready for the next race!

Other topics covered during the motor seminars included the effects of different brushes and springs, and how they would best suit different applications. Choosing motors and maintaining them is a broad topic, but these seminars provided racers with a lot of information on which to base their decisions. ■

Tony Neisinger, affectionately referred to by his new teammates as "Van Hampster," peaks batteries with Ernie Provetti just before one of the exhibition runs.

Battery Seminar

Led by Tyree Phillips, Rick Hohwart and Terry Rott, the battery seminar provided racers with straightforward information about battery choice, charging and proper use.

They recommended running 1200 SCR cells for stock-class racing and 1700 SCE cells for modified racing. While this may sound simple, they explained how different the two types of cells are and how they should be charged for optimum efficiency. For 1200 SCR cells with a peak charger, they recommended charging at a rate of approximately 9 amps until the pack peaks. The pack is then pulled from the charger, and just prior to racing, put on the charger again to be "peaked" at 9 amps.

They recommended charging 1700 cells in a much more cautious fashion, at a rate not higher than 3.5 amps. These batteries are also peaked, but at the same rate of 3.5 amps.

Other topics included battery chargers and, more specifically, the new breed of linear and soft-pulse-rate chargers that are designed with the delicate 1700 cells in mind. Discharging was also discussed. Although the seminar was only scheduled to run 30 minutes, it lasted for over two hours, but the panel of experts was more than happy to answer all the questions. This enthusiasm was typical of the entire event. ■

The temporary hobby shop set up by J.J.'s R/C Speedshop supplied racers with all the parts they needed to stay on the track. This young racer broke a T-plate.

administrator, John Thawley, who conceived the racing program with Ernie Provetti.

Throughout the weekend, knowledgeable representatives conducted seminars that addressed virtually every aspect of on-road racing. These seminars included: How to Set Up your Differential, by "Dr. Diff" Bud Bartos; Beginner Motor Care and Maintenance, by Rick Hohwart, Ernie Provetti and Kevin Mauer; Chassis Set-Up, by Chris Doseck, Bob Hunt, Terry Rott, Tim Morton (owner of TRC) and Tony Neiseng; Intermediate Motor Care and Maintenance by Ernie Provetti, Kevin Mauer and Rick Hohwart; and a final seminar on battery charging by Tyree Phillips, Rick Hohwart and Terry Rott. Some participants had their names drawn from a hat and an invitational driver went over their cars one-to-one and offered them some hints on how to turn some faster laps times.

To make the racing environment as relaxing as possible, the Detroit Hilton extended every possible courtesy to the racers. A snack-food bar was set up outside the ballroom where the track was constructed, and all the luxuries of a comfortable room were within 60 seconds of the track. Also trackside were a number of Nor-Cal Accu-Chargers for the racers to peak their batteries while they were waiting for their heats to come up. A race schedule was even broadcast on the hotel's television network to let the racers know exactly when their heats were up. If you had a little time, you could kick back on your bed and take in one of your favorite shows. Bet you never had pit accommodations like *that* before!

This crew member has his hands full with two cars to place on the starting grid, and wouldn't you know it?—one doesn't work.

In the two rounds of qualifying, each of the competitors, including the "pros," ran the Speedworks 25-turn motors for both 1/10- and 1/12-scale classes. A pair of invitational exhibition runs and seminars on chassis, differentials, and basic motor care and maintenance were worked around the qualifying heats on Friday.

Differential Seminar

At four different times throughout the weekend, "Dr. Diff," Bud Bartos, hosted a differential seminar and spoke about the best methods of adjusting and maintaining a diff. To the exceptionally large crowd, Bud explained the value of keeping the diff properly adjusted and free of debris. To improve the action of the standard diff, he had his axle turned down on a lathe and sleeved with brass tubing. This allowed him to use a bearing in the center of the spur gear and permitted equal distribution of power to both wheels, as well as smoother diff action. For a more consistent diff, Bud also recommended pinning the diff rings to prevent them from slipping while accelerating or cornering.

During assembly, place a small amount of diff lube on the balls. To set the differential, hold each rear wheel in your hands and try to rotate the gear with your thumb. You want this set so that the gear doesn't slip, but you still want a smooth and free differential action at the wheels. Bud warns that over-tightening could put undue stress on the diff rings, which would cause pits on the surface. If this has happened to your diff, it's possible to hold the spur gear and rotate one of the wheels to make a "channel" in the ring for smoother operation. ■

Saturday's program was very similar, with the final two qualifying heats for both 1/10- and 1/12-scale and four invitational exhibition runs. Saturday's seminars included two more differential workshops (for those who were busy prepping their cars and couldn't make the others), intermediate motor care and maintenance, and the final seminar for the weekend: battery charging.

Sunday was reserved for solid racing. Starting the day were the lower mains up through the A-Main in 1/12-scale, followed by the last hurrah for the invitational drivers. Rounding out the day were the 1/10-scale mains, starting from the lower and working up to the A-Main. If this sounds like a schedule that would have you staring at the LED on your charger waiting for your batteries to peak, you're mistaken. Although a tight schedule is imperative for a smoothly running event, the schedule was designed to allow those racing in both classes time to prepare their cars. During the mains, even the racers who weren't quite ready to drop their cars on the grid at roll call because of mechanical or radio frequency problems were extended every concession to allow them a fair chance to compete. A case in point: When one of the racers needed a battery pack to compete in his final qualifier, Joe Lawrence, who was running in the following invitational exhibition, unselfishly snipped the freshly charged batteries out his car to allow his friend to run—sportsmanship at its best.

To give you a play-by-play of how the racing actually happened and who won which heat with what car would be missing the point of the race. This new concept in racing provides a forum for everyone to pit their driving skills against others without losing prey to the "hard to get" items that can contribute to the victory. The racers who were fortunate enough to drive their way to victory in the A-Mains were rewarded with attractive plaques for 4th to 10th places and beautiful trophies for 1st, 2nd and 3rd places. The king-size trophies for the 1st-place finishers were topped with a solid silver cup that drove the price of each to well over a g-note. When we asked Ernie Provetti, "Why?," he replied, "I want these people to go home with the same tro-

(Continued on page 138)

Chassis Seminar

This was a very popular seminar for those who wanted to learn about the tricks of tweaking from the pros. Helpful hints about tires and shocks were also discussed.

There are two acceptable methods for checking the tweak (the position of the front tires in relation to the rear): the "lift" method of picking up the car from the rear at the center line with an X-Acto blade, and the use of a tweak board. The object is to have the car sit as flat as possible without biasing the weight towards one side or the other. The means of adjustment varies from car to car, but it's usually very simple and the results will improve the car's handling.

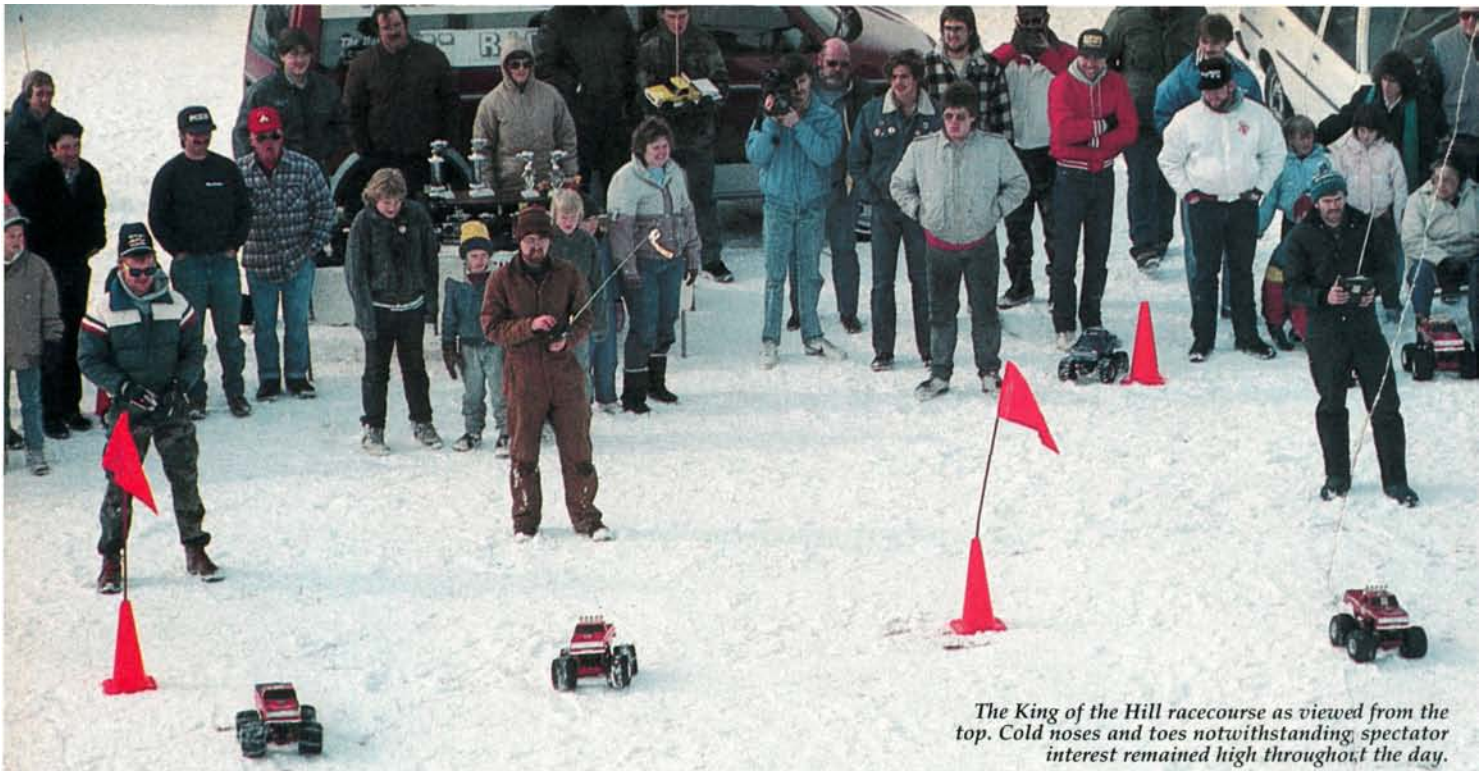
Other questions concerned the choice of tire compounds for both carpet and asphalt. Tim Morton from TRC talked about tire choices and also mentioned that a new tire for asphalt racing is being developed that should last up to 100 times longer than foam tires!

The caster angle on the front end is also related to tires and how well they stick. The more caster, the less sensitive your steering will be. If you want more traction in the front end, bring the king pins to a more upright angle (less caster).

Word has it that Trinity is working on another Sportsman Cup for off-road racing that will be run under the same format, and top professional drivers and manufacturers will again provide you with first-hand information. ■

Far left: Chris Nichols of Omaha, NE, is shown here with Trinity team driver "Little Dude" Chris Doseck, who offered him some handling and tuning tips for his 12L.

Grand Marshal of the Trinity camp and sponsor of the Speedworks Sportsman Cup, Ernie Provetti is ready to put Chris Doseck's Pro 10 on the line for the start of one of the exhibition heats.



The King of the Hill racecourse as viewed from the top. Cold noses and toes notwithstanding, spectator interest remained high throughout the day.

KING OF THE HILL

by LINDA REIMER COOK

WINTERS IN WISCONSIN are usually braved only by the skiers and the skaters, but on a Sunday afternoon in February 1989, the King of the Hill competition saw a new breed of winter warriors: the R/C truckers.

Held in Janesville, WI, the competition was a race up a 30-degree hill. It was 75 feet up to the top pylon, which the racers had to circle before coming back down the hill to cross the finish line. The event was double elimination, with three competitors in each heat, and it was divided into two classes: 2WD and 4WD trucks. The only limitation was the requirement that all use a 7.2V battery pack; otherwise, it was anything goes.

Over 35 entrants brought out their Big Brutes, Clod Busters, Lunch Boxes, Midnight Pumpkins, Double Dares and Blackfoots to see if they could "top" the hill and each other. Several inches of packed snow proved to be a real challenge as the drivers tried their best to avoid spinning their tires on the steep slope.

Those who went for a test-climb before the day of the race were equipped with the most unusual-looking tires, which had been "decorated" with wood screws, insulation staples and a wide variety of homemade chains. The steepness of the hill brought out additional last-minute accessories for the trucks. These included wheelie

Flat-head wood screws were used on this Blackfoot for traction in the snow. Some people will do anything to claw their way to the top!

MONSTERS ON ICE

bars, wrenches taped to front bumpers, and extra battery packs strapped on. One competitor even attached two rolls of quarters to his truck's front end to keep it on the track. He incurred added expense when his truck, hitting a marking cone, dislodged the quarters, which rolled down the hill among the 200 spectators. *Anything* to win!

Many of the entrants were new to the

2WD contender equipped with chains, charging for the top.

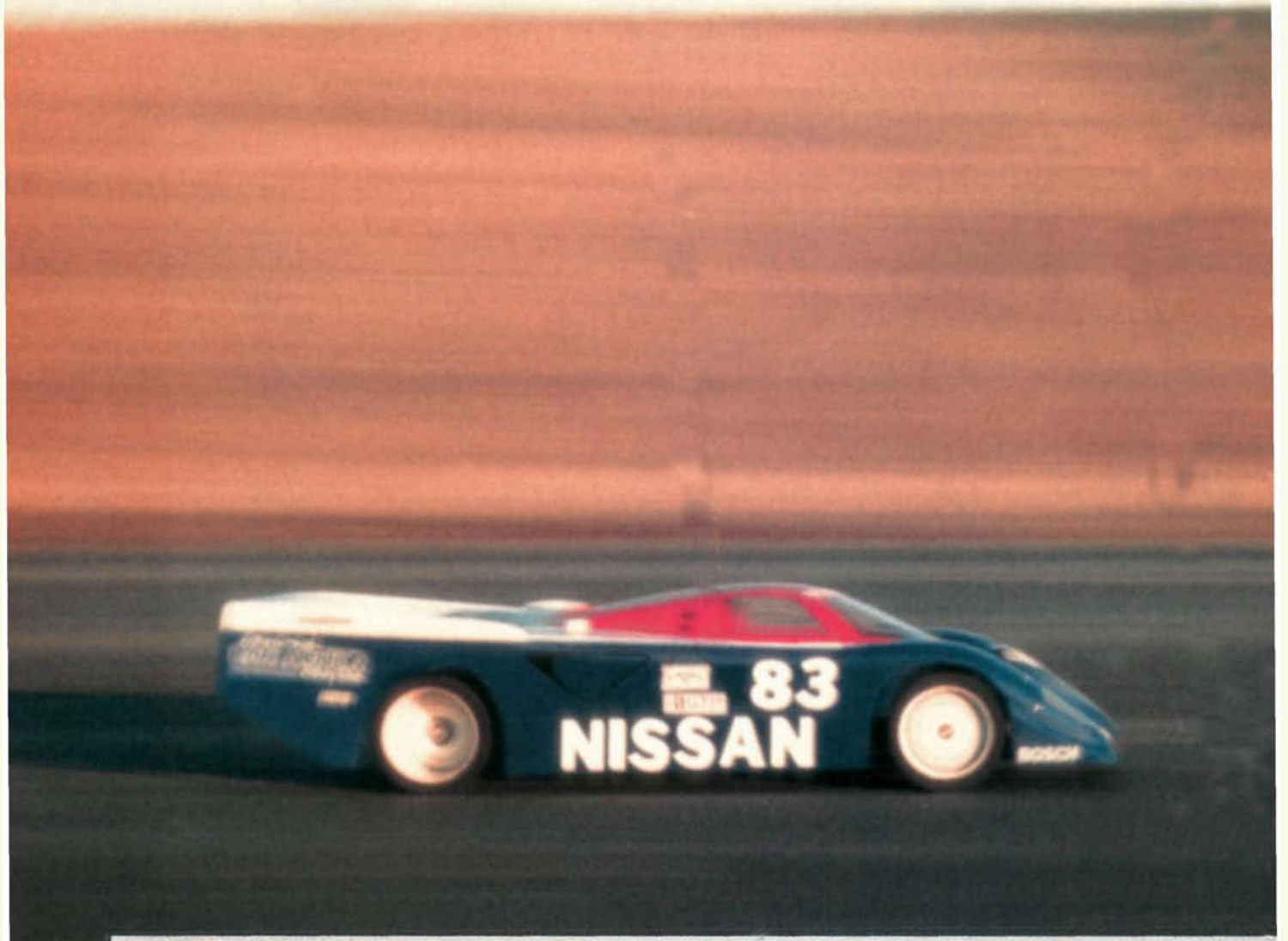
R/C sport, and this was their very first competition. Enthusiastic spectators were entertained by a lot of wild driving, as trucks were thrown off course by the uneven terrain. Somersaults, rolls and head-on crashes kept the cameramen from the local television station busy, as they tried to cover the action, and some of the event was shown that night on the news in Madison, WI.

After two hours of competition, the final race in the Senior 4WD Class was between two Clod Busters. Smooth driving by Paul Roberts earned him a 1st-place victory, which he attributed to prior practice on the hill. "The fastest way to the top is a straight line, which takes controlled steering," he said. Paul used chains on his front tires and spikes on the rear tires. Ron Benish, the senior 2WD champ, claimed that a more powerful, modified motor, along with spiked tires, brought his Big Brute across the finish line first.

The event was conceived and sponsored by The Hobby Shop and the city of Janesville. It was created to stimulate interest in the hobby and to give R/C truckers a chance to chase away those winter-time blues, and it certainly *did!* ■

TRACK REPORT

by WALLY DAVID



GROUND CONTROL

ON THE FRONT of the Cobra's instruction booklet you'll find a logo that says, "Cobra—The Racer's Choice." Well, when it comes to picking a 1/10-scale on-road car, C&M Manufacturing* does give racers a choice as it offers three versions of the Cobra, and this Track Report covers the Cobra II.

There are many similarities and a few differences between the Cobra (reviewed in the November '88 issue of *Car Action*) and the Cobra II. Both cars use Associated* 12L front-suspension arms and plastic axle/motor blocks, a simple rear friction dampening system with large, plastic nuts for adjusting the movement of the rear pod, a steel axle, full ball bearings, and TRC* BBS wheels with green rubber for the front and yellow for the back.

While the differences are few, some are very important. The biggest difference lies in the chassis department. While the flat Cobra chassis allows the use of either stick battery packs or

C&M's

COBRA II

: Cobra II, with battery slots cut out, is
e saddle packs. To me, saddle packs are
:ause they allow the weight to be more
this makes the car more stable in han-
y cut-out slots will lower the car's cen-

rglass and suspension components are
ndard Cobra components are green. The
ith graphite.
s on the Cobra II are made of polished
ide hub on the Cobra is aluminum, but
I've seen plastic hubs shatter or become
Plastic hubs also tend to have a problem
stripping out. The aluminum hubs run

ttery slots cut out, is
me, saddle packs are
ie weight to be more
r more stable in han-
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sion components are
onents are green. The

are made of polished
bra is aluminum, but
ibs shatter or become
nd to have a problem
e aluminum hubs run

truer and stand up better to racing wear and abuse.

As seems to be the case with many products these days, the instructions left something to be desired. While the written instructions were pretty clear, the photographs were of little help. They look like photocopies of photocopies of photographs. By the time the photographs were reproduced in the booklet, no details were visible. If the manufacturers can't reproduce photographs clearly in their instructions, exploded-view drawings may be a better way to go. This would make it easier to figure out what the parts look like

To guide the complete Cobra II, chose a Futaba* Magnum Junior radio system, and I installed an S-132H high-speed servo to steer the car. To secure the servo, the Cobra II instructions recommend using servo tape and tie-wraps, but I've seen too many races lost because of

NISSAN IS ON A ROLL

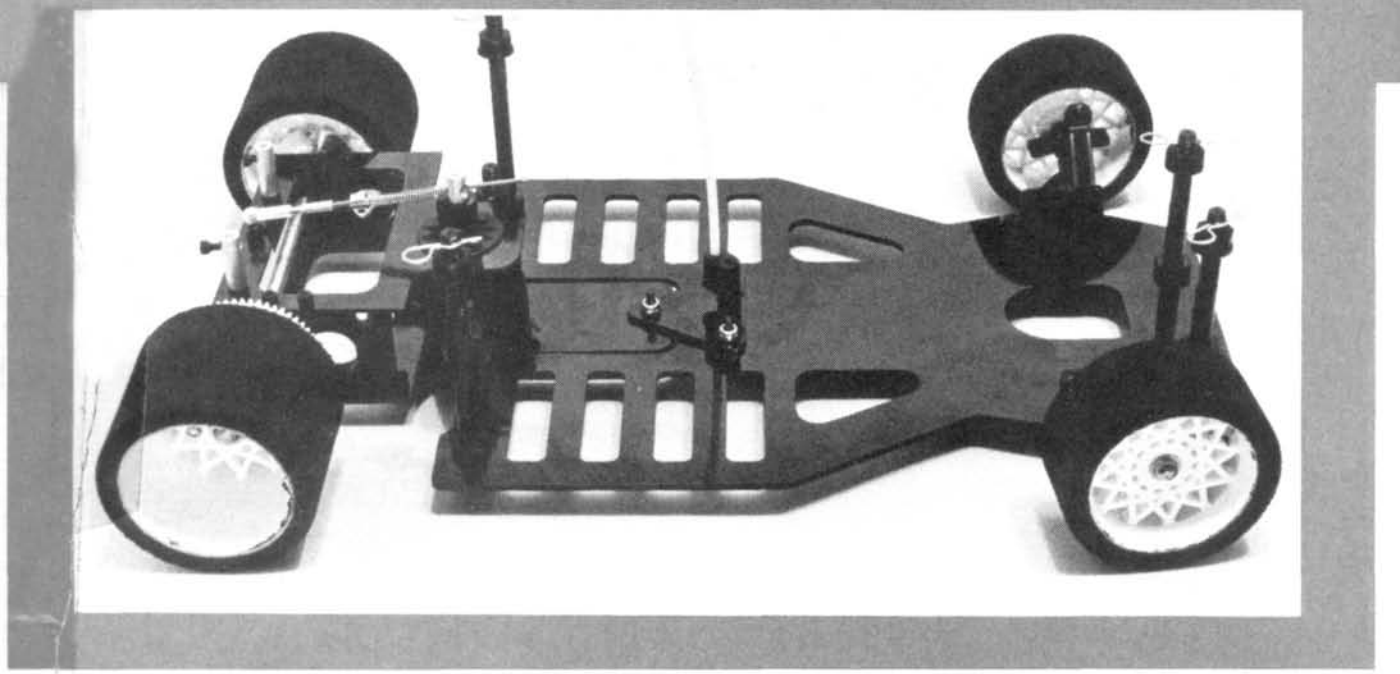
by WALLY DAVID

WHEN THE 1988 IMSA Camel GTP season began, everyone involved in GTP racing wondered whether the Jaguar XJR-9 would finally unseat the Porsche 962 as the premier prototype sports car. The 962 was said to be outdated - a dinosaur, if you will. The Jaguar was expected to battle tooth and nail for supremacy. No one expected the Electramotive Nissan GTP ZX-Turbo to rewrite the IMSA record books.

PHOTO BY MIKE LEE

In the past, the Nissan had shown flashes of brilliance that were usually extinguished by reliability problems. The company almost always had the fastest car on the track, but could never seem to keep it together.

1988 was to be very different. With a newly designed aluminum honeycomb chassis, which was stronger and easier to work on during a race weekend, the Electramotive team had what it took to



Overall view of the Cobra II. Note the battery cutouts. Unlike the original Cobra that could use a flat pack, the weight distribution is adjustable and a slightly lower center of gravity is obtainable with the new Cobra II, but you're limited to using only saddle packs with this car. Kit comes with TRC BBS wheel: green dot rubber in the front and yellow in the rear.

a servo coming loose. Instead, I suggest using Associated servo-mount blocks, which will stand up to the worst wrecks. You'll have to supply steering linkages and a servo saver. I used a Kimbrough* servo saver and Parma* heavy-duty threaded rods and rod ends.

A Futaba mini receiver relayed the radio signals to a Novak* T-1X electronic speed control. For a powerplant, I chose a Revtech* stock motor.

The new Nissan GTP body by BoLINK* was the body of choice for my Cobra II. Bill Henning, of Henning Scale Models* in Lansdale, PA, created an exact replica of the Electramotive Nissan GTP. With Geoff Brabham behind the wheel, the Nissan won the 1988 IMSA Camel GTP Championship. The BoLINK body has excellent detailing, but is still very durable. Bill used Pactra's blue, red and white paints. The white Nissan lettering and numbers were bought at a stationery store, and the small decals came from various Parma and Autographic* decal sheets.

PERFORMANCE: For the first track test, the Cobra II was taken to a nearby parking lot to see how it would handle—and handle it *did*. Even though traction was poor (owing to road salt left over from a recent snowfall), the Cobra II went exactly where it was pointed. From the parking lot, it was off to face the competition.

The Cobra II was entered in the Wednesday night Modified Class on the carpet roadcourse at Henning Scale Models Raceway. After one test run, it was determined that this snake had incredible bite (traction, that is)—so much bite that it was lifting up the inside front tire while going through the turns. After tightening the rear damper plate, which required disassem-

(Continued on page 64)

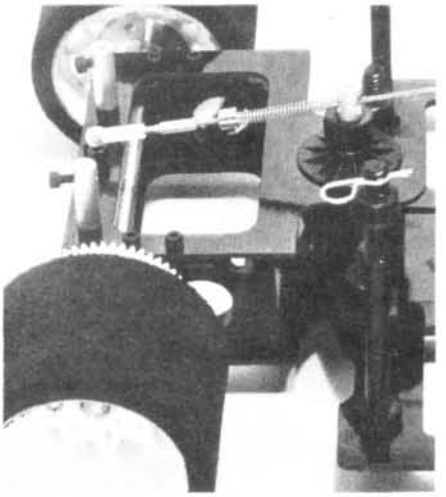
finish races, and a switch from Bridgestone to Goodyear provided reliable tires.

No longer distracted by Indy car racing, lead driver Geoff Brabham was able to devote his full attention to winning the championship - and win, he did. Brabham and the Electramotive team won a record eight straight races and a record-tying nine wins in a season. He also grabbed seven poles (fastest qualifying time) and set ten fastest laps during races (nine of which were track records).

This string of top-notch performances, including a number of come-from-behind wins, carried Brabham to the GTP Championship. Nissan (for the most part, a one-car team) lost the Manufacturer's title by only one point to Porsche, which made up the majority of the field at each race, while skipping the 24 Hours of Daytona and the 12 Hours of Sebring - endurance races for which extra points were awarded.

The start of the 1989 season has seen Nissan continue its winning ways. After running for over 14 hours at the 24 Hours of Daytona before retiring, Brabham and team went on to win the Grand Prix of Miami, the 12 Hours of Sebring and Road Atlanta. In winning the Sebring race, Nissan became the first Japanese manufacturer ever to gain the number-one spot in an endurance event. It seems that Jaguar and the many legions of Porsches will once again be fighting for second place. ■

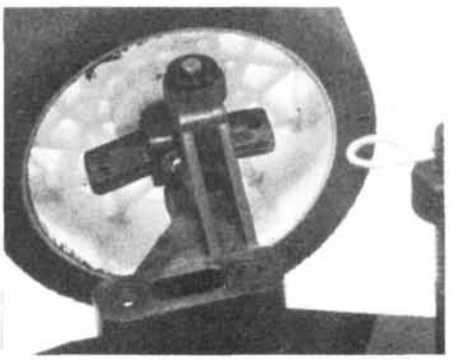
COBRA II



The Cobra II's rear pod. Car comes with full ball bearings and supersmooth diff.

bling much of the rear end, I was able to TQ and win the A-Main. A number of BoLINK Eliminators, a TRC Pro 10 and two regular Cobras (among others) were beaten in the process—and my Cobra's stock Revtech motor was racing against *all kinds* of modified motors!

Overall, the Cobra II was easy to build and easy to drive. While it was a little difficult to make trackside chassis adjustments, once made, the car was very competitive. With better illustrations, and some time spent setting it up, the Cobra II can be a strong contender.



Like the original Cobra, this version has Associated 12L front-suspension units.

**Here are the addresses of the companies mentioned in this article:*

C&M Manufacturing, *P.O. Box 680-233, Park City, UT 84068.*

Associated Electrics, *3585 Cadillac Ave., Costa Mesa, CA 92626.*

TRC, *P.O. Box 1058, 2211 Charter St., Ablemarle, NC 28001.*

Futaba Industries, *4 Studebaker, Irvine, CA 92718.*

Kimbrough Products, *1430 East St. Andrews Place/Unit F, Santa Ana, CA 92705.*

Parma International Inc., *13927 Progress Parkway, North Royalton, OH 44133.*

Novak Electronics, Inc., *128-C E. Dyer Rd., Santa Ana, CA 92707.*

Revtech R/C Products, *7401 White Lane # 19, Bakersfield, CA 93309.*

BoLINK R/C Cars, *420 Hosea Rd., Lawrenceville, GA 30245.*

Henning Scale Models, Inc., *128 South Line St., Lansdale, PA 19034.*

Autographics of California, *7401 White Lane #1, Bakersfield, CA 93309.* ■

C&M

COBRA II

Type ..... On-road racer
Scale 1/10
Sug. Retail Price $179.95

DIMENSIONS:
Overall Length ..... Approx. 18 inches
Width ..... Approx. 9 inches
Height ..... Approx. 4 1/2 inches
Wheelbase ..... 10 5/8 inches
Front Track ..... 8 3/8 inches
Rear Track ..... 8 5/8 inches

WEIGHT:
Gross (w/bat) ..... 42 ounces

BODY:
Type ..... BoLINK Nissan GTP (not incl.)
Material ..... Lexan

CHASSIS:
Type ..... Pan w/T-plate
Material ..... Fiberglass

DRIVE TRAIN:
Type ..... Pinion/spur
Differential ..... Adjustable ball
Bearings/bushings ..... Ball bearings

SUSPENSION:
Front: Type ..... Independent
Dampening ..... Coil spring
Rear: Type ..... T-plate
Dampening ... Damper and friction plates

WHEELS:
Front: Type ..... TRC BBS
Dimensions (DxW) ..... 2x1 inches
Rear: Type ..... TRC BBS
Dimensions (DxW) ..... 2x2 inches

TIRES:
Front ..... Green foam
Rear ..... Yellow foam

ELECTRICS:
Motor ..... Revtech Stock
Battery Req'd. ..... 6-cell saddle pack
Speed Controller ..... Electronic suggested

OPTIONS AS TESTED:
Futaba Magnum Jr. radio, S-132H high-speed servo, BoLINK Nissan GTP body, Novak T-1X speed controller.

COMMENTS:
The Cobra is a very stable car with neutral handling, but it's somewhat difficult to adjust at the track. The photos in the instruction booklet were very poor reproductions and of little use. The Cobra kit comes complete with full ball bearings and a very smooth differential.

SCOPING OUT

by JOHN RIST

TALK ABOUT A FUN and exciting job; writing for the world's greatest R/C car magazine is hard to beat. This month, *R/C Car Action* sent me Altech Electronics'* PK122 speed controller to bench-test and to put through its paces while mounted in a car.

The PK122 has the following features:

- BEC (battery elimination circuit)
- forward, reverse and brakes
- .5-second delay on reverse
- 3 LEDs for adjusting speed controler
- 90 amps continuous-current capability (fused at 25 amps)
- 240-amp peak-current capability
- built-in heat sink
- built-in fuse
- supplied adjustment screwdriver
- moderate price

Altech's first offering in the speed-controller market is well-thought-out, easy to set up and fun to use. For car drivers who are tired of the hassle of setting up pesky mechanical speed controllers, this could be the controller for you.

ALTECH'S PK122 SPEED CONTROLLER—NICE FOR THE PRICE

Although the PK 122 is a little large at 1.88x1.65x1 inches and weighs 2.6 ounces, it's smaller and weighs less than the servo/speed controller combination it replaces. Size-wise it should fit just about any 1/10-scale car or truck.

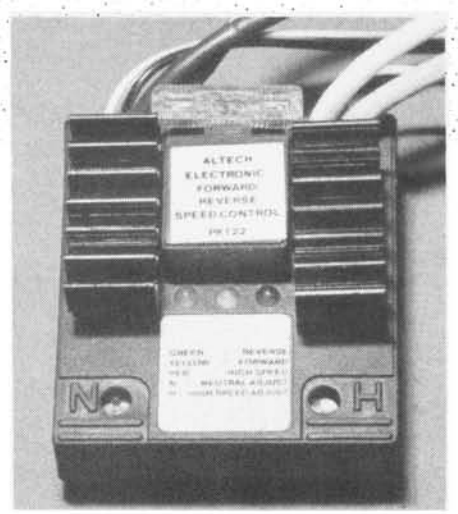
The first major hurdle for this speed controller was the lab test. My lab setup consists of an oscilloscope, digital voltmeter, resistor load bank, and a 6-cell 1200mAh battery pack. To guarantee that the controller is fully on, the oscilloscope is used to monitor the controller's output and to measure the reverse delay. The digital voltmeter is used to take all the voltage-drop readings and to verify the current-meter's reading. The resistor load bank is a bank of 40, 12 ohm, 5-watt power resistors that can be switched on and off one at a time to vary the load between .6 amp and a hammering 24 amps. In series with the resistors is a 25-amp Simpson current meter and a 1-percent .01 ohm resistor. By measuring the voltage drop across this resistor, the current-meter reading can be double-checked. Of course, the battery supplies the test voltage.

I plugged the speed controller into the test setup. One word of caution! The receiver plug is of the type that fits Acoms Challenger, Futaba J, and some newer MRC systems. What this really means is that the connector isn't keyed and can be plugged in backwards. Because the power lead is in the middle of this connector, there's a good chance that nothing will be damaged, but if plugged in backwards, the car won't run. To avoid this, I plugged the steering servo into the receiver first and then matched the wire colors on the speed-controller plug.

The next step was to set the neutral and high-speed adjustments. The instruction sheet failed to tell me how to set the throttle-servo travel-limit adjustments on my transmitter. It did mention that you should set the trim to its midpoint. I recommend that the servo travel limits be set to maximum travel as described in your transmitter handbook. Of course, not all transmitters have this adjustment.

With the transmitter controllers set properly, I applied power by turning on the power switch. With the supplied screwdriver, I adjusted the neutral-adjustment screw till all the lights went out. The

(Continued on page 68)



TEST DATA

Model PK122

DIMENSIONS:

Height	1.06 inches
Width	1.65 inches
Length	1.88 inches
Weight	2.6 ounces
Access to Controls	Good
Ease of Adjustment	Good

ELECTRICAL:

(Manufacturer's Specs)	
Max Voltage	8.4 volts
Min Voltage	6.0 volts
Max Current Forward	240 amps
Max Current Reverse	180 amps
Continuous-Current Forward	90 amps
Continuous-Current Reverse	45 amps
Fuse (built-in)	25 amps
Max Voltage Drop	.015 V/A (At 12 amps would = .18 volts)

TEST PARAMETERS:

Voltage	6 volts (6-cell pack with heavy load)
Current	12 amps
Voltage Drop	.51volts
Suggested Retail Price	$69.95

COMMENTS:

A very cost-effective unit that's well thought-out. Would like mounting ears for switch. Forward throttle response is smooth. Perfect unit for those sick of mechanical speed controllers.

next step was to advance the throttle on the transmitter to the 80-percent-on point. I then adjusted the high-speed adjustment screw until the yellow forward and the red high-speed lights came on. The oscilloscope verified that at 100-percent throttle, the controller turns on fully. Slamming the throttle to reverse caused the green reverse light to turn on, and the oscilloscope verified that the controller was in reverse. I then set the load panel to consume 12 amps of current and measured the voltage drop across the speed controller. My instruments indicated that the controller has a .5V drop when forced to handle a 12-amp load. This is considerably more than the .18V claimed by the speed-controller manufacturer. To compete in the numbers game, the manufacturers always state only the MOSFET control element loss and not the total loss of the speed controller. When doing the lab test, I measure from input battery connector to output motor connector. This, of course, includes the loss due to fuse, wire, printed-circuit board, solder joints and the crimp joints between the wiring and the connectors, as well as the MOSFETs.

The next step in the lab test was to short the motor leads together and hit the throttle. Yes, my good friends, the fuse *did* blow, but the speed controller wasn't damaged. The unit appears bulletproof. The only difficulty I encountered was that the blown fuse refused to come out. It took much prying with a screwdriver and tugging with wire cutters to get it out. So be careful not to crack the case the first time you must replace the fuse.

The last step in the test was to measure the reverse delay. On my setup, this delay measured .5 seconds, which is long enough to soften the blow to the motor-transmission setup in the car, but not long enough to be noticeable when driving the car.

Every time I pushed the throttle in the reverse direction, I could hear a clicking sound in the speed controller. This, coupled with the fact that the controller has only six MOSFETs, led me to suspect that the controller had a relay hidden inside. I generally don't like relays because their contacts can easily burn and render them useless. To get a closer look at the relay, I disassembled the speed controller. (Do *not* take your own speed controller apart, because the MOSFETs can easily be blown with static electricity.) The arrangement I found is pictured in Figures 1 and 2. Figure 1 illustrates that when the car is going forward, the forward MOSFETs apply positive voltage to the positive terminal of the motor, and the relay connects the negative terminal of the battery to the negative terminal of the motor. In this mode, the forward MOSFETs are the elements that provide the speed control of the motor. Figure 2 illustrates that when running in reverse, the reverse MOSFETs apply the positive terminal of the battery to the negative terminal of the motor, and the relay connects the negative terminal of the battery to the positive terminal of the motor. The reverse MOSFETs apply about 50 percent of the available voltage to the motor, to provide a fixed, but reasonable, reverse speed.

Now for the neat trick that keeps the relay from burning up. During the .5-second delay between forward and reverse, both forward and reverse MOSFETs are *off*. During this time, no current is flowing and the relay can be safely switched without arcing and sparking. To further

(Continued on page 143)

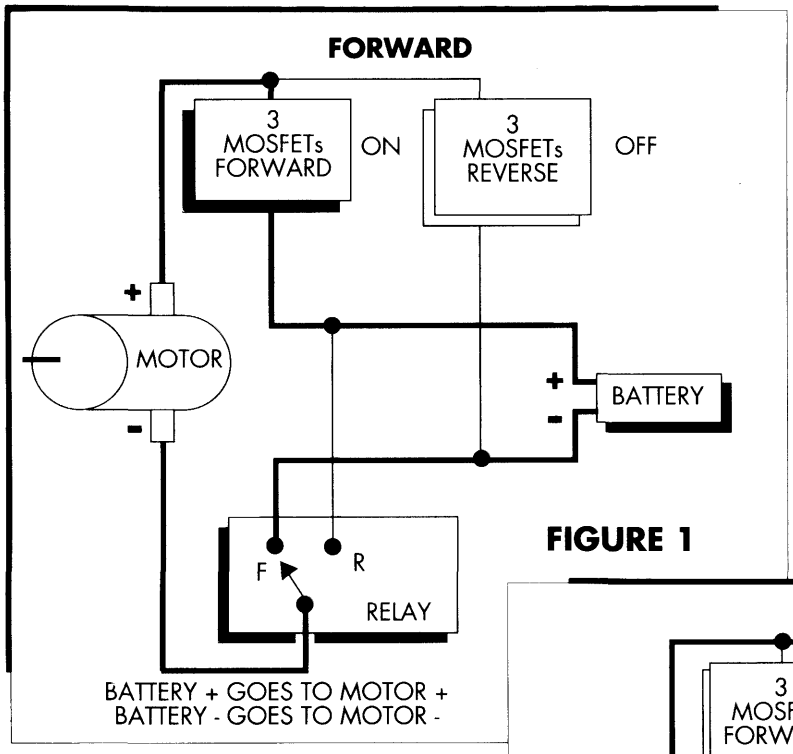


FIGURE 1

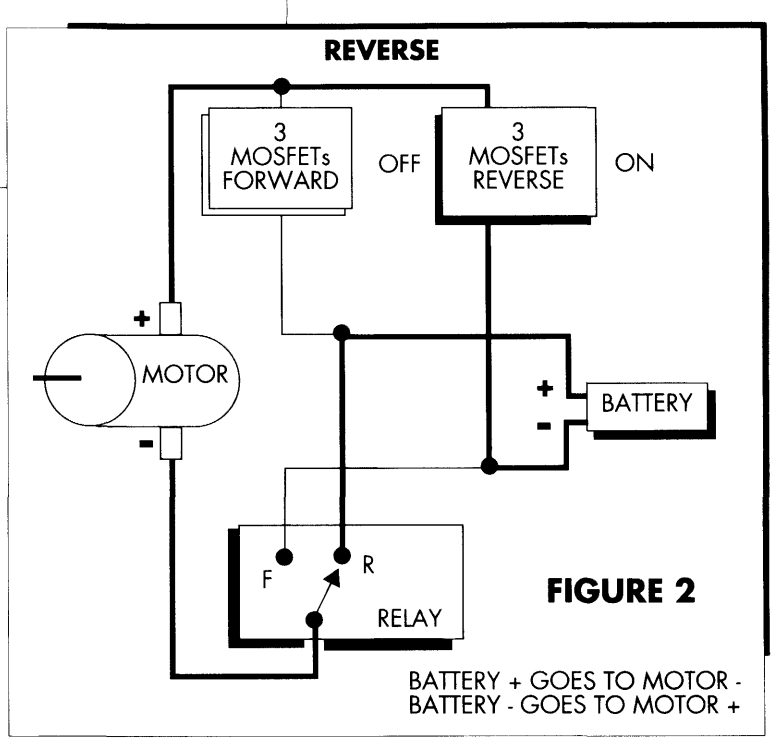


FIGURE 2

BUDGET RACER

HORSEPOWER + TRACTION = LOWER LAP TIMES

by DICK BRINTON

IN LAST MONTH'S issue of *Car Action*, I wrote that using the stock motor, the Kyosho* Raider was turning laps on Sacramento Mini-Wheels' dirt oval in the low 9 seconds per lap. Owners Paul and Marge Schiager have a computer lap scorer that tracks the whole race, car by car, with each lap-time printed out. What a tuning aid this is!

Besides making the necessary suspension adjustments, I used the stock rear tires that had the spikes clipped down, so that only the base lugs were left. The addition of an Associated* RC10 wing completed the major changes.

At this point, the Raider was lapping the track without lifting off the throttle at all. The car ran out near the wall on the main straight, entered the south turn using the outside groove, dove down to just kiss the inside berm about two thirds of the way through the turn and drifted out to the wall on the back straight. The north turn worked the same way. As long as I didn't miss the line, the Raider repeated lap after lap without varying half a second!

However, one problem surfaced in a number of race situations. The car was very squirrelly off the line, and when I got back on the throttle at low speed (as in heavy traffic) it was squirrelly and spun out, forcing me to slow down at times. Because of this, the car just wasn't fast enough to run with the RC10s, Ultimas and JR-X2s, but help was on the way.

Kyosho sent me a pair of its new, stock-class motors: the Super Stock 20 and the Super Stock 34. Also in the package was a set of DuraTrax* No. 5010 front tires and a set of No. 4112 full-spike rear tires.

Being a bit conservative, and because I already had serious traction problems, I broke-in the Super Stock 20 according to

the manufacturer's directions and installed it using the 18-tooth pinion in the Raider.

The DuraTrax tires went on both ends of the car. "Hey, wait a minute," you say. What about the clipped spikes that were on the car? Why replace them with a new set of spikes? I tried both sets, and the new spikes worked a bit better on the track that day. These particular spiked tires seem to have hard spikes but soft sidewalls, and this combination provided faster lap times.

When you make changes to your car, be sure to time a number of laps to get a good reading on how the changes affect your car. Have a friend use a stopwatch and write down the times when you call "time" as your car passes the lap mark. One or two laps aren't enough. To get an accurate picture, you should run at least ten clean laps.

With these changes, things improved right away, just in time for the Saturday afternoon oval races. Prior to the races, I did a thorough check of the car to make sure nothing was loose or out of adjustment. I cleaned the speed controller wiper blade and the resistor using Reedy* motor cleaner, followed by power spray that I applied with Q-Tips. I'm still using the Parma* speed controller and it's working perfectly. Since most of the oval is run at full throttle, I don't think there's much of an advantage to an electronic speed controller. Spend your money on tires instead.

The DuraTrax No. 5010 front tires have hard spikes and softer sidewalls, which help understeer and lap times.

I ran my usual range check of the radio system by placing the car on a large coffee can, running the motor and steering with the transmitter antenna collapsed. I wanted to see how far away I could get without glitching. Make this check with your car and establish the range so you can check it before hauling it to the race track. I also charge my battery packs at home, so I only have to top them off at the track.

Finally, it was time to line up for the first Production Heat Race. A Raider, two RC10s, an Ultima and a JR-X2 made for some fast company. I had trouble with the start (remember the squirrelly start problem) and finished 3rd.

The second heat race was better. The Raider exited the first turn in 4th, was in 3rd about midway and won by half a lap. The Raider and the JR-X2 ran nose to tail for the last ten laps. The JR-X2 was a bit faster on the straights, but the Raider handled the turns better. Finally, the JR-X2 got hung-up in lapped traffic and that was that. Yes, the Raider was haulin'. It ran five of the 25 laps in the eights, including one at 8.3 seconds, which was within one second of the best 2WD time that evening. Everything was fine until the Main.

Then that big problem—the wild, fishtailing start—cost the race. The Raider got nailed by a car from the second row, lost the steering rod to the right-front wheel

Like the front tires, these DuraTrax No. 4112 full-spike rears are low-profile and worked well on our dirt oval.

BUDGET RACER

and ran the whole race with only left-front steering. This is not the fastest way around the track! The Raider finished last.

The Raider is a pretty sturdy car and, with the exception of losing a front tire, this is the first failure of any kind. If you had seen some of the crashes (sometimes I get in over my head), you'd appreciate how well this car has held up.

But even a sturdy car without a strong, straight start is at a big disadvantage. It was actually better to start the Raider in the back row and depend on speed and handling to make the passes, rather than risk getting nailed from behind by a car that accelerated faster.

The problem seemed to be in the non-adjustable differential. The Raider's differential features a carrier gear that carries the bevel pinion gears, just like nearly all non-adjustable differential cars. This type of differential gets looser with wear, until hard acceleration causes the car to veer one way or the other in a very unpredictable manner. On hard starts, the power would spin whichever wheel was the least loaded. Until the car got up to speed, the power would switch back and forth away from the tire that had the best traction at that moment.

But the Raider diff has a slightly different design. It's sealed with two side pieces that are screwed together. This bit of engineering made all the difference in the world. This diff is adjustable—in a manner of speaking. I disassembled it completely, cleaned it, and packed the differential housing with Sta-Lube Hi-Temp wheel-bearing grease. This grease is thick and stiffens up the diff action a lot.

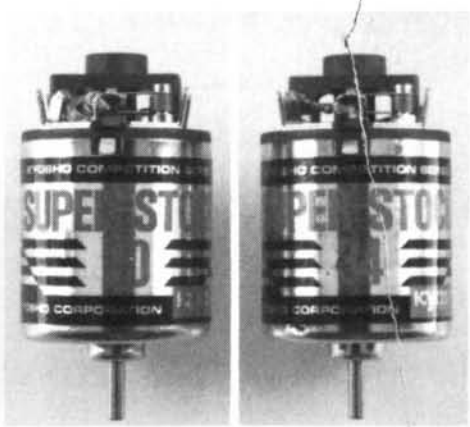
Please note: Don't try this method in a normal open-style differential, as this grease will create a lot of unwanted drag; perhaps enough to burn up your motor. I haven't had enough running time to know if this lube is bad news for the plastic side plates or the carrier gear, so you may want to smear some on a spare piece of plastic. Leave it for a week or so to see if the plastic softens or disappears!

While I had the transmission/differential apart, I checked the gears for wear and tear. Everything appeared OK. You may remember that I used Radio Shack's Archer Lube-Gel with Teflon and it seems to work fine.

Kyosho sent a set of its low-profile rear wheels and tires, part No. MA-17-HY (yellow rear wheels) and part No. W-5074 low-profile, spiked rear tires. They also included a matching set of yellow front wheels (Part No. UM-39) onto which I mounted the DuraTrax No. 5010 front tires.

I took the car back to the track and tried a series of hard throttle starts. The results were much better. While the car could certainly benefit from an adjustable differential, the heavy grease and the low-profile tires added up to straight, fairly hard starts. Now I don't have to worry about the cars on the back rows.

The Raider is a serious dirt-oval car. I've added the Kyosho Mini-Gold shocks all around, changed tires, packed the diff with Sta-Lube grease, changed to a Kyosho Super Stock 20 motor, and added the RC10 wing. The rest of the setup is in adjustments, which I've detailed in earlier articles in this series.



The new Kyosho Super Stock Motors are ROAR-legal. The numbers 20 and 34 stand for the amount of timing.

The car uses the stock chassis and stock suspension parts. You can even get away with the stock speed controller, but I put in the Parma mechanical unit, because I prefer more braking power.

I'm very impressed with the Raider. For less than $200 (kit plus modifications, but not including radio or batteries), you can have a solid oval track car that will run competitively in Production class.

What's next for the Raider? Sacramento Mini-Wheels now has a large, chemically etched concrete oval. I'm getting a sprinter body for the Raider and I'll work out the hot set-up for the pavement oval.

Stay tuned!

**Here are the addresses of the manufacturers mentioned in this article:*
Kyosho; *distributed by Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61820.*
Associated Electrics, *3585 Cadillac Ave., Costa Mesa, CA 92626.*
DuraTrax; *distributed by Great Planes Model Distributors.*
Reedy Co., 3585 Cadillac Ave., Costa *Mesa, CA 92626.*
Parma International, Inc., *13927 Progress Prkwy., OH 44133.* ■

DIRT DIGEST

by BOB KANE & BILL O'BRIEN

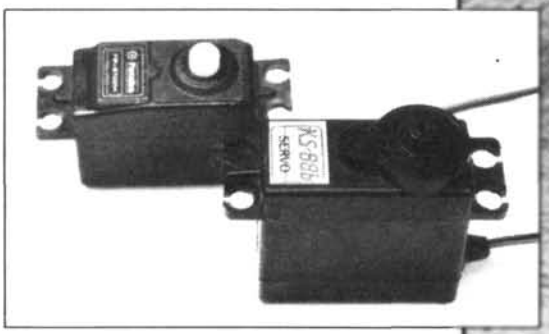
R/C WEIGHT-WATCHING WINS WACES

I HAPPEN TO have an intimate knowledge of some of the problems associated with weight. I'm not going to show you a picture to prove it; you'll just have to take my word. So when Bob was out running his Cat XLS and the new kid showed up with an XLS of his own to knock down "the older guy who runs his funny painted car in the park," I sort of knew ahead of time what would happen.

The rolling chassis was identical for both cars, and each had an Ultrastock motor bolted to the gearbox. Both used 6-cell matched SCE battery packs, and both carried Aristo-Craft* 2PX pistol radios (although Bob's radio looked a little tired next to the brand-new box the kid carried) and electronic speed controllers.

That pretty much sounds like a pair of equally matched cars, but I wouldn't be bothering you with this story if they took a few turns around the course and the best they could do was side-by-side racing. Bob ran away with it and, putting on that Cheshire-cat smile, left me to do the explaining to the broken-hearted kid. I wasn't going to tell him that Bob was a better driver—I just wouldn't give Bob the satisfaction—so I took both cars, sat down under the shade of a nearby tree, peeled back the Cat bodies and tried to give the kid a little education.

His Cat was pure Aristo-Craft inside with an SP-2040 speed controller, a 402x42 ounce/inch servo swinging the front wheels and an Aristo 2-channel receiver commanding the rest of the electronics. It's a good, inexpensive setup—but a little too heavy for competitive racing.



Futaba's S-132H servo weighs in at 1.28 ounces, while the Kyosho KS-88 chugs along at 1.6 ounces. Even if you don't think the weight savings alone is significant, the S-132H packs nearly 30 percent more torque to boot.

Everyone changes their wheels and tires, although not always to the greatest advantage. The stock Optima Mid equipment on the left tilts the scales at 2.24 ounces. The Bru-Line Super System wheel and beefier ProLine Comanche tire are 2.82 ounces—more than 1/2 ounce heavier . That's an addition of more than 2 ounces for a set of four.

PHOTO BY WALLY DAVID

dissipate the heat from a nuclear blast.) If you figure that the average 6-cell pack weighs about 11 ounces and the average can-type motor packs a 9-ounce punch, you wind up with a car that weighs more than 27 ounces before you even count the chassis, differential(s), wheels and tires, and the painted body.

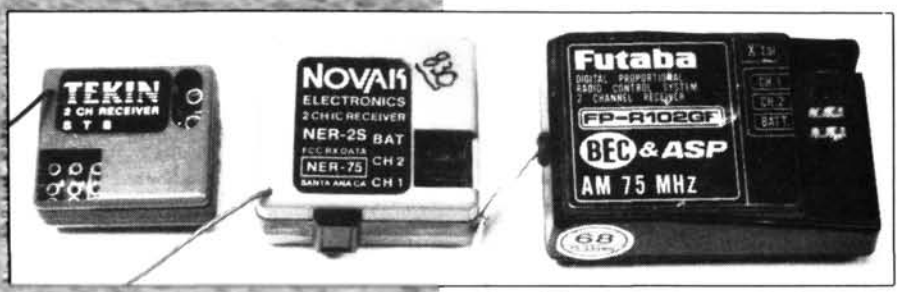
The inside of Bob's Cat was totally orange. A Novak* mini servo tugged at the wheels, a Novak mini receiver portioned out the commands from the 2PX

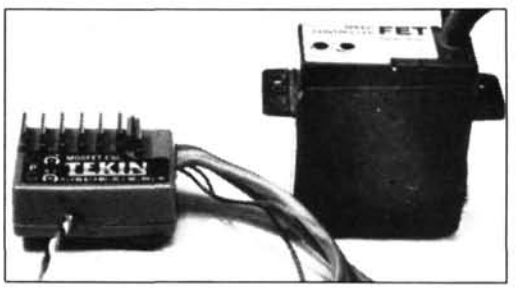
about 3.5 pounds, and you have a distinct advantage over your porkier opponent. Of course, there are other things you can do to further decrease the weight of your car, such as using a graphite chassis and other lightweight parts.

Heavy Rubber

Why go through all this trouble? To win, of course. And you *can* win because you use less energy to move lighter objects than to move heavier objects. If you have a lot of energy (an SCR pack feeding a hot motor) you can move the lighter object faster and for a longer time. (That's physics, and even if Milliken ball experiments are boring, a lot of physics applies to car technology, so don't skip the class.)

Are electronics the only things to worry about? No. One of the first things we do to our cars is change the wheels and tires. I, for example, bought a pair of Bru Line* Supersystem wheels and ProLine* Comanche tires for my Optima Mid. What did I find? A stock wheel and tire weighed 2.24 ounces. A new wheel and tire





Above left: In the receiver weight department, the big loser is the porky Futaba R102GF, at just under 1.3 ounces. The Tekin on the left was the lightest, weighing in at .3 ounce. Novak's NER-2S weighs just under .8 ounce.

Above right: Partly at fault for Futaba's paunchy receiver is the BEC they've included. If you use an electronic speed controller like the Tekin (left) or Circus (right) you don't need the BEC feature. Despite the obvious size difference, the Tekin is only .32 ounce lighter, at 2.08 ounces.

Weight Happens

About three years ago, I was running that setup in my Frog. Out of curiosity, I pulled out the radio gear and weighed it. You could have pushed me over with a tie rod! The total weight was 7.04 ounces! (The SP-2040 comes with heat sinks that could

radio, and a Novak Econo II speed controller supplied the forward motion. The Novak equipment must have spent its early life at a health club, because it weighs in at a tiny 3.36 ounces—less than half the weight of the Aristo-Craft gear.

All of a sudden, your car now weighs

weighed 2.72 ounces. So .48 ounces is a big deal, right? Yes, it is, especially when you multiply it by four. When you do that, you suddenly discover that you've added nearly 2 ounces to your car—and just when you've gone through all that non-

(Continued on page 166)

SILENT SLAYER

KYOSHO AXIS

by MIKE LEE

COMPARED WITH the other classes of R/C racing, road racing in the smaller 1/12-scale class hasn't seen a whole lot of action recently. In off-road racing, a new car comes out almost every week, but when something new comes out in 1/12 scale, road-racing fans look closely to see what the new kid on the block has to offer.

Kyosho* has introduced the newest 1/12-scale road rocket: the Axis EX. This race car is a grand departure from Kyosho's previous road cars, none of which has made a big splash here in the States. Having driven the Plazma Mk III and the aggressive Fantom 4WD road cars, I admit to reverting to my American-made car after some trial and error on the tracks. Now, however, I might just have to change my mind, because the new Axis has some radical new features that show promise.

The Axis is a pan-chassis road vehicle made of high-strength graphite and covered with a coating of some type of vinyl. This covering is apparently intended to prevent accidental electrical conductivity from the battery, or other power sources, from surging through the chassis. To dampen side-to-side movement, the Axis has miniature shocks mounted to the rear motor pod. Although these are small and only hold air, they're quite effective. At the differential, Kyosho has finally got rid of its planetary gear diff and has incorporated a ball diff that resembles those found in today's popular on-road cars. But Kyosho has gone one step further: Instead of the hardened-steel diff plates used in the domestic cars, Kyosho is now using a super-hard ceramic diff plate that provides very smooth action. Sound interesting? Let's put one together and find out.

THE KIT: The Axis uses a front-beam axle assembly that's similar to those on many domestic cars. The mounts are equipped with a setscrew so that you can adjust the caster setting. My only complaint in this area is that the kit provides only *one* setscrew for the whole axle, and you can't get that single screw tight enough to keep the front end from changing caster position when it meets a wall, or other barrier. Even a *slight* impact can cause movement. You can cure this either by finding the caster setting you like and then cutting a groove into the axle beam to keep it there with the setscrew, or finding another setscrew that measures 4x4mm.

Unfortunately, the front end is fixed with about 2 degrees of positive camber. I prefer an adjustable camber, but Kyosho says differently.

Continuing our inspection, we find the front knuckle arms and wheel shafts. The knuckle arm is really two pieces; one piece is placed inside the other, and then the wheel pin and kingpin are inserted and locked into place. The assembly is mounted to the front hub with the suspension springs and locked in. Kyosho must be expecting the springs up front to encounter some rather rough service, as they're quite stiff. Rounding out the front end are the front wheel hubs, which are the same as those found in most other road cars from the Far East.

At the rear end, we find Kyosho making use of some bar-stock aluminum for the axle mounts. These are machined, polished and mated to the upper plate with Allen-head screws. In between the axle mounts there's an aluminum spacer bar, followed by the shock mounts that attach to the outside of the axle mounts. This assembly is now placed on the T-bar, or rear chassis, and the rear axle is put through the whole thing.

High-quality ball bearings are provided throughout the car, and the rear axle can be adjusted for ground clearance, or tire diameter, by using a set of bearing holders, which have varied hole positions. Whatever you do, don't throw away any of these, because you'll need them later on.

The rear pod assembly is mounted to the main chassis with two main screws, one of which is run through a pivot ball. (This allows the free movement of the rear pod.) To increase the roll resistance of the rear end, a joint stiffener is attached to the top of the chassis joint. A few more screws, and the rear pod is attached to the aluminum chassis.

The rear differential is where we find that exotic hardware. The Axis once again takes the high-tech road and is equipped with 64-pitch gears. Two spur gears are supplied: a 95-tooth and a 97-tooth. The pinion gear is a 22-tooth unit that's specially hardened and coated for maximum life and quiet running. Unfortunately, only another Kyosho 64-pitch spur gear will fit the axle. Pinions will be readily available from domestic stock.

At the diff, we find a graphite axle (another hooray) with the primary diff holder attached. It's glued in, and you must be careful here, as the glue might prevent the spur-gear bearing from seating all the way down. Mine was found this way, and the cure was just a slight trimming away.

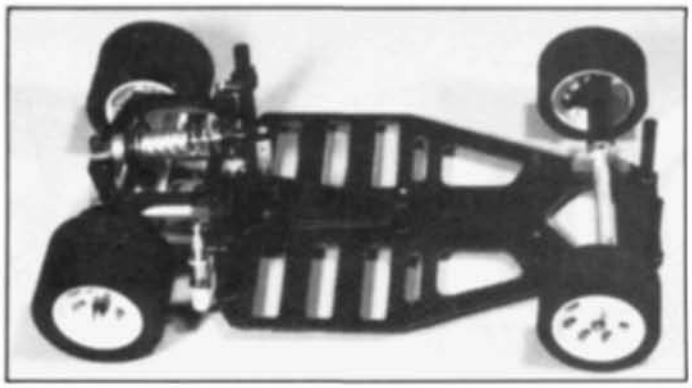
Back to the action: The spur gear does indeed have a bearing in the middle of it!—a ball bearing, and this keeps the spur rotating in a uniform orbit. The diff plates are ceramic and look a bit fragile, but they're apparently up to the job at hand. One side is polished like glass, and it's this side that faces the balls in the diff. The result is a diff that's so smooth that you'll find a good, clean area with a white cover on which to assemble this bearing, because the balls in the bearing are supertiny. Once done, the effect on the diff is worth the effort.

Kyosho's Can-Am-style body has a very low profile and should slip through the air very easily. The rear wing is also included in the kit.

Now to the shocks, and there are three of them. The main shock is a no-sweat affair: a mini-size Kyosho Gold shock that's mounted over the top of the rear pod and runs to the main chassis. The two side shocks are different: They hold only air, no oil. The pistons are made of sponge rubber, and they're a snug fit inside the shock body. As a result, air inside the shock has a tough time getting through the sponge, and that provides the dampening effect. Small springs are installed on the outside of the shock bodies, and two sets are provided in the kit. I used the softer set; the stiffer set would be used for high-traction courses. The shocks are installed on the rear pod mount and then to brackets attached to the rear body posts.

After all this, the chassis is pretty well finished, leaving only the radio equipment to install. My radio installation was complemented by the use of an electronic speed controller from Dialed Racing Products*. A Dialed model 360 Electronic Speed Controller fit under the hood nicely, but not quite where the kit's instructions recommended. The Axis calls for the speed controller to be mounted on the roll-stiffener plate, just between the battery locations. You can't use a very wide or very tall speed controller, because the blasted thing will get in the way of something. However, there's plenty of

After mounting the diff, the adjusting nut at the tip of the axle is tightened. A tiny 3mm thrust bearing must be assembled from the kit and placed on the axle for adjustment. I recommend that you wish that all diffs could be made this way in the future.



Top view of the Axis showing completed chassis. The fairly long and wide graphite Axis chassis permits easy radio installation.

KYOSHO

AXIS EX

Type ..... On-road
Scale 1/12
Sug. Retail Price $399.95

DIMENSIONS:
Overall Length ..... 10.15 inches (chassis only)
Width ..... 6.5 inches
Height ..... 1.9 inches (chassis only)
Wheelbase ..... 7.95 inches
Front Track ..... 5.6 inches
Rear Track ..... 5.3 inches

WEIGHT:
Gross (w/bat.) ..... 32.5 ounces

BODY:
Type ..... CRC Mk.II Can-Am
Material ..... Polycarbonate

CHASSIS:
Type ..... Pan
Material ..... Graphite

DRIVE TRAIN:
Type (pri./sec.) ..... Spur and pinion
Differential ..... Ball type
Bearings/bushings ..... Ball bearings

SUSPENSION:
Front: Type ..... Independent springs
Dampening ..... Friction
Rear: Type ..... Coil-over shocks
Dampening ..... Oil- and air-filled dampeners

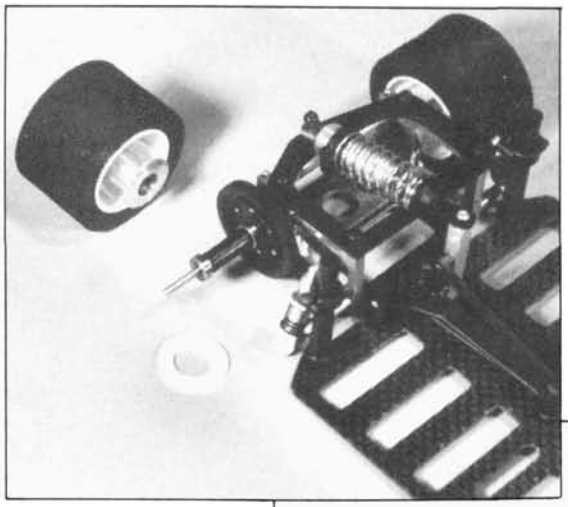
WHEELS:
Front: Type ..... Plastic holed
Dimensions (DxW) ..... 1.37x.85 inches
Rear: Type ..... Plastic holed
Dimensions (DxW) ..... 1.37x1.40 inches

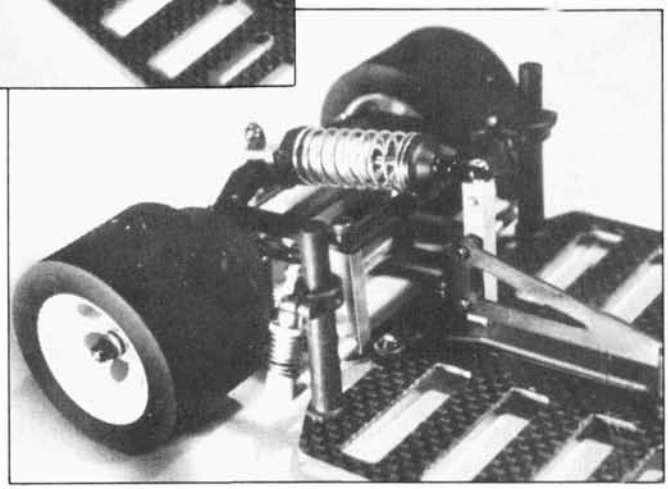
TIRES:
Front ..... Foam
Rear ..... Foam

ELECTRICS:
Motor ..... Reedy Gold Dot (not incl.)
Battery Req'd. ..... 6-cell saddle pack (not incl.)
Speed Controller ..... Dialed Racing 360 (not incl.)

OPTIONS AS TESTED:
KO Propo EX-5 radio with Dialed Racing 360 speed controller, Reedy Gold Dot modified motor, Sanyo 6-Cell SCE battery.

COMMENTS:
The Axis displays very good handling out of the box and has tremendous race potential. Ceramic diff rings work great. On the downside, the pan-head screws were of poor quality, the caster setting didn't hold up to wall-banging, and the tires were slightly out-of-round.





Left: With the right rear wheel removed, the ceramic diff plate is shown alongside the graphite axle. The ceramic diff plates provide very smooth differential action. Below: Close-up of rear end shows small side shocks that control sway. The shock on the top is a Kyosho Mini Gold. Note the T-bar stiffener on the center mount.

room up front, just behind the steering servo and ahead of the batteries. In fact, both receiver and controller will fit side by side up there with no problem.

The body supplied with the Axis is a nameless body, but it closely resembles the popular Can-Am-type bodies. The shape is dynamite and should have great aerodynamics. In another departure from the past, Kyosho has made this body quite light, but very uniform in thickness. Kyosho is serious with the whole car. Carefully cut the rear panel out of the body before you begin painting. Then cut the molded wing out of the panel. After painting the wing, it can be mounted using the hardware included in the kit. Using Pactra* Racing Paints, the body was painted in metalflake silver and black with a red pinstripe accent, and the kit provides plenty of good decals.

As the Axis was meant to run with the fast guys, I put a real motivator motor into it. A Reedy* Modified Gold Dot triple was installed and mated to a set of Sanyo* SCE 1700mAh batteries. Charge up the cells and head for the racetrack!

Before I get to running, let me tell you about one disappointing feature of the hardware in this kit. The main screws (countersunk pan-head screws) used to hold items to the chassis are made of aluminum and are of poor quality. I found that the screw slots weren't uniform in depth, and this caused screwdrivers to either seat or spall out. Also, as they're made of mild aluminum, you can't torque these screws at all. They'll simply bend or shave away, and this makes them useless. In my kit, some screws had to be replaced with steel countersunk screws.

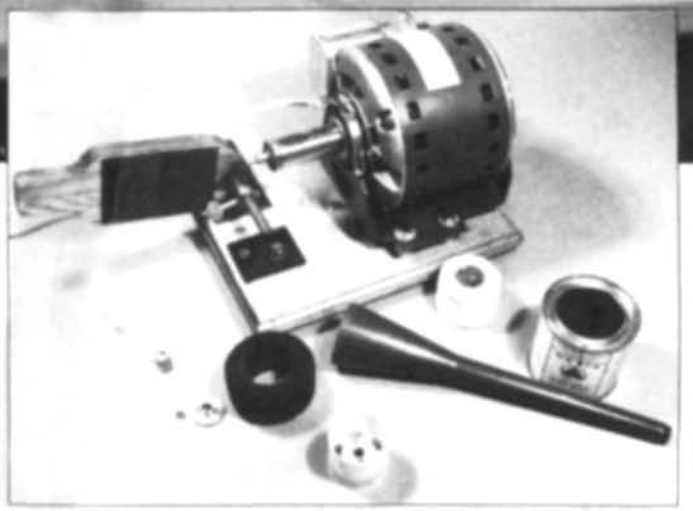
PERFORMANCE: At the track, the Axis turned heads all over the pits. The initial reaction was one of wonder as drivers and pit men poured over it to see what it had. Most liked what they saw and were in total awe of the smooth ceramic diff. Now, let's see what it does on the track.

I found myself on the course of the Hot Trick Carpeted Raceway in Vista, CA. The track is entirely of indoor/outdoor-type carpet and it has 3-inch plastic barriers. Tests proved the Axis was ready for running—no problem.

On opening the throttle, the Reedy Modified obliged my command and sent the Axis rocketing down the track. Surprise, surprise!: The Axis was ready with good handling and corner-hugging speed. This was *without* the body on.

On mounting the body (with wing), the Axis handled like it was on rails. Steering was positive and quick, allowing almost immediate oversteering if hit hard. The rear end stuck to the track well, with power transmission coming smoothly

(Continued on page 169)



Materials needed are tire glue, surgical cloth tape, tire horn (or modified transmission funnel), lacquer thinner and, of course tire-truing machine; in this case, Pro Proven Products' unit.

PRO PROVEN PRODUCTS

TIRE TRUING MACHINE

P A R T 1

Be smooth, stay in the groove

PICTURE THIS: You're in one of the most important races of the season, and you're up against seven of the track's top drivers. Your only security is knowing that each of your opponents has the same track-issued stock motor and about the same high-tech equipment, e.g., batteries, electronic speed controllers and radio systems. As you stand high on the drivers' platform, your trigger finger starts to feel clammy and your mind wanders through a mental checklist of the last-minute details. Before you know it, the starting signal fires and the race is on. All the cars are even for the first few turns, but when they approach the main straightaway, the lead car takes off like a rocket and leaves you and the rest of the pack in the dust. Four minutes later, the race is over and you feel good that you ran a clean race.

When the final race results are tallied, however, you find that the lead car finished three laps ahead of you. You can't help but wonder what that guy did to his car to improve its performance so dramatically. With the sour taste of defeat in your mouth, you decide to follow the tradition of all good sportsmen and go over to congratulate the victor, not to mention cast a suspicious eye on his race machine

to try to analyze his secret. Your roving eye sweeps briskly over the winning car again and again, but you can't pinpoint any striking detail that's out of the ordinary...but the tires, something's different about those tires...

That's right, those tires hold the secret to the car's winning edge: a combination of proper truing, balance and, most important, an accurately calculated gear-to-tire ratio. Proper tire preparation has always been a real problem unless you were lucky enough to have a lathe, and most racers have had to rely on pre-mounted and trued factory tires.

Well, now there shouldn't be any more tire problems, thanks to Bill Horne of Pro Proven Products*, who realized the need for a simple-to-use truing machine. After many months of research and several prototypes, Bill has introduced a virtually bullet-proof truing machine that enables you to true practically any 1/12- or 1/10 -scale foam tire to specific, calculated dimensions each and every time—in a matter of minutes! The nucleus of the machine's design is its superstrong G.E. electric motor to which a machined steel shaft collar is attached. This motor is attached

by JOE BRUNI

TIRE TRUING

to a sturdy wooden platform that lies perpendicular to a tough truing paddle mounted on a steel slide shaft. This shaft has an adjustable stop collar that enables you to repeat accurate cuts every time. Each machine comes with a handy instruction sheet that explains how to true front and rear 1/10- and 1/12-scale tires.

To properly true my tires on the Pro Proven Products machine, I put together a kit composed of standard foam tire glue, a roll of cloth surgical tape, a tire horn, safety goggles and some lacquer thinner. The tire horn can be made by cutting off the funnel end of a transmission fluid funnel at a point where the cut end will match the diameter of the scale rim on which you want to mount the tires.

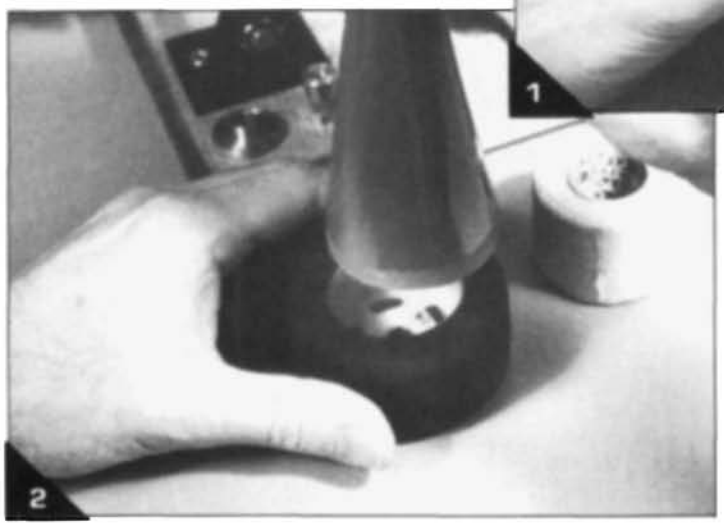
Whatever type of tire you intend to true, adapt a consistent order of operation. I usually begin by placing a layer of surgical tape on the rim, making sure that the entire outer surface of the rim is covered. The tape is an excellent binding material for the tire glue, and also allows you to remove worn or damaged tires simply by peeling the tape, along with the tire, from the rim. Apply a generous coat of tire glue to both the rim (tape) and to the inner aspect of the tire, and let the glue set for a few minutes. Dip the tire into the lacquer thinner. Place the tire on the tire horn and position the horn over the rim. Slide the tire onto the rim so that the tire is flush to the surface of the workbench. Allow the tire to bind to the rim for a few minutes, then follow the instructions for placing the rim on the truing machine. Use a sharp hobby knife to carefully trim the excess tire from the rim. Before truing the tire, remove the wheel and let it set overnight.

Pro Proven Products suggests that you align the machine before truing the first wheel, because the alignment could be altered during shipping. To do this, mount a rim (without a tire) onto the steel shaft and secure it as if you were going to begin truing. Loosen the four motor-mounting nuts that are under the motor and slide the truing paddle against the mounted rim until the paddle is totally flat on the rim. At this point, tighten the four motor-mounting screws, and your machine should be properly aligned. Check the alignment frequently, or if you notice dissymmetry after truing your tires. Always use safety goggles to avoid eye injury.

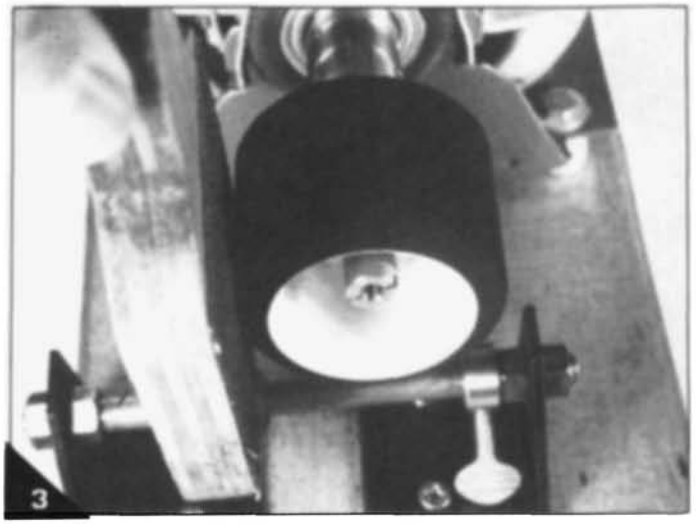
After allowing the tires to cure overnight, mount the first tire and let the rub-

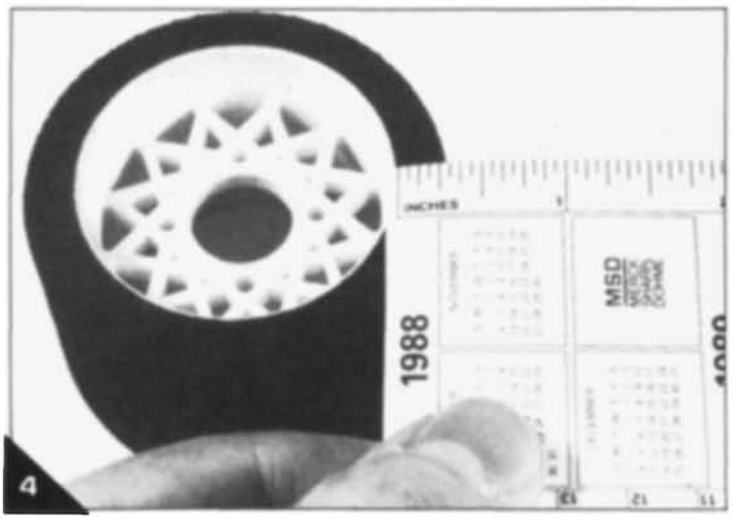
(Continued on page 171)

After the wheel and inside of the tire are coated with glue and allowed to tack-up, slip the tire over the horn onto the wheel using lacquer thinner as lubricant.



Use the surface you're working on to make sure that the wheel and tire are flush. The upper side of the tire and wheel assembly will be made flush while it's being trued.





Above: It's always good to use a light touch when truing; however, the Pro Proven Products unit has an adjustable stop in case you slip.

Left: Don't forget the rules! If you trim too much to get that ultra-low-profile tire, you may be kicked out of the race. Check the rules at your local track.

RC10 TORPEDO

(Continued from page 24)

color-coded, so if you don't know what you're using, simply look at the color of the oil. Simple enough? A good starting point for the average track would be 30-weight oil in the front and 20-weight oil in the rear.

Hanging off the end of these suspension components are Associated's new TQ rims and tires. To accommodate the low-profile TQ tires, the rims are larger in diameter than the stock equipment. The tires are available in different tread patterns, as well as soft, medium and hard compounds, and they have considerably less side-wall flex. This will give you more consistent handling and also reduce the likelihood of rollovers. If you're serious about racing, it might be a good idea to pick up a couple of different tread styles and compounds. It wouldn't make sense to put this kind of work into your car, only to be held back by the wrong tire combination.

To swing the front wheels, a Team Losi Turnbuckle Set was put into action. The stock servo-saver/turnbuckle combination works relatively well, but it has often been known to fail at crucial moments. The turnbuckles might be a relatively expensive fix, but with one less thing to worry about, it's much easier to concentrate on getting the car around the track.

Powering the steering assembly is Futaba's* new FP-S135S mini servo, which is connected to the more impressive Futaba PCM radio. Without going into the remarkable features of this radio

(Continued on page 88)

RC10 TORPEDO

(Continued from page 87)

system, I'll just say that it's virtually infallible. It won't drive the car for you, but with proper maintenance, your chances of getting radio interference in even the most hostile environment is as close to zero as it will ever be. (Look for a complete review in the next issue.)

Attached to the second channel of the PCM is the latest in speed-controller technology from Tekin Electronics*. Its new ESC300 PT is of the TempFET variety, which will protect the speed controller by shutting down if there's too much heat buildup. This speed controller is the less expensive version of Tekin's two new TempFET controllers and, at first, its lower amperage rating had me wondering whether it would meet the current demands of the hot modified motors. But, subsequent tests soothed my nerves. Even with the hottest motors designed for 2WD off-road racing, the ESC300 provided the almost fluid throttle response for which electronic speed controls are noted, and it operated well within an acceptable temperature range (heat sinks and a location where air flow will aid cooling are a must).

On the receiving end of the Tekin controller is one of the latest 2WD winds from Trinity. To be introduced as the new Joel Johnson 2WD off-road motor, this new "classified" wind is designed for the discharge characteristics of the 1700mAh SCE cells that are so common in modified racing. The new wind configuration allows the power to come on in a smoother manner. This makes for a very

(Continued on page 106)

by DICK BRINTON

MRC/TAMIYA

GRASSHOPPER II

THE VERY FIRST off-road R/C car I ever saw was the Grasshopper, and I've often wondered how many people got started in this dynamic hobby with this particular car. Its design has been the basis for countless "clones"—as they say in the computer business. There's probably no R/C car store in the country that doesn't have a Grasshopper kit or a car kit based on it somewhere on the shelves.

A New and Improved Entry-Level Favorite

What made this car so popular? Why is it still a reasonable starting point for someone who wants to learn about R/C cars?

Part of the reason for the Grasshopper's popularity is that it was the first, or one of the first, mass-marketed non-toy R/C cars. MRC/Tamiya* did its homework to find potential buyers and then ran a professional advertising campaign. Pretty soon, a lot of people wanted to get their hands on the Grasshopper.

MRC/Tamiya did one other thing, and this was the key to the car's success. They developed

(Continued on page 95)

GRASSHOPPER

(Continued from page 93)

a solid kit with *good instructions*. Even a first-time buyer could end up with a car that ran well and would take some abuse without falling apart. As well as this, Tamiya produced a lot of hop-up parts so that these first-time buyers could upgrade if they choose to. The Grasshopper II follows in its predecessor's footsteps. Sure, its design is getting dated, and there are some sophisticated entry-level cars out there that will probably run circles around it on a track, but the Grasshopper is a good, basic R/C car.

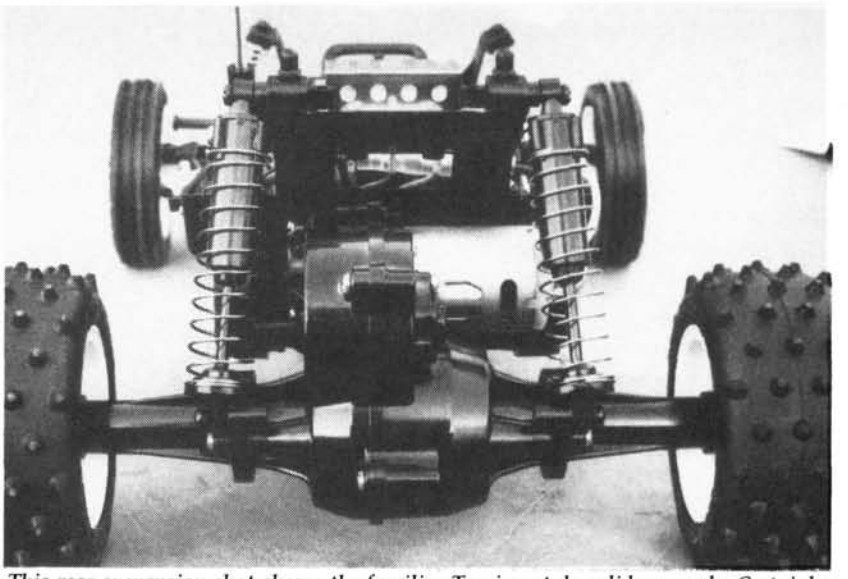
ASSEMBLY: Once again, MRC/Tamiya has done a great job on the instructions. They also include a "helpful hints" sheet and an exploded view of the complete car, and this includes a parts list with retail prices, which is very handy when repairs are needed. I followed the directions exactly. Each step is understandable and complete, and I didn't find any place where the instructions were hard to follow. Every step is illustrated with accurate drawings, and there's a sidebar that shows the sizes of the screws and the special pieces necessary. I finished the car in two evenings.

I used the new MRC Top Gun radio in the Grasshopper. This wheel radio, which is available on the 75MHz band, performed very well. The range is good, and I saw no evidence of glitching during any of my tests.

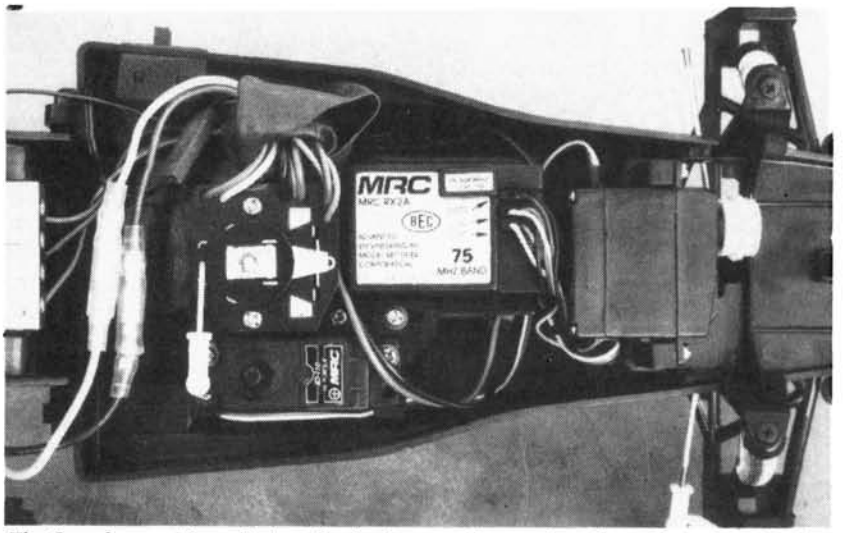
The Top Gun features:

- Servo-reversing
- Battery eliminator in the receiver
- Pistol-grip transmitter that's very well-balanced
- Throttle high and low adjustments
- Throttle-neutral adjustment
- Steering trim

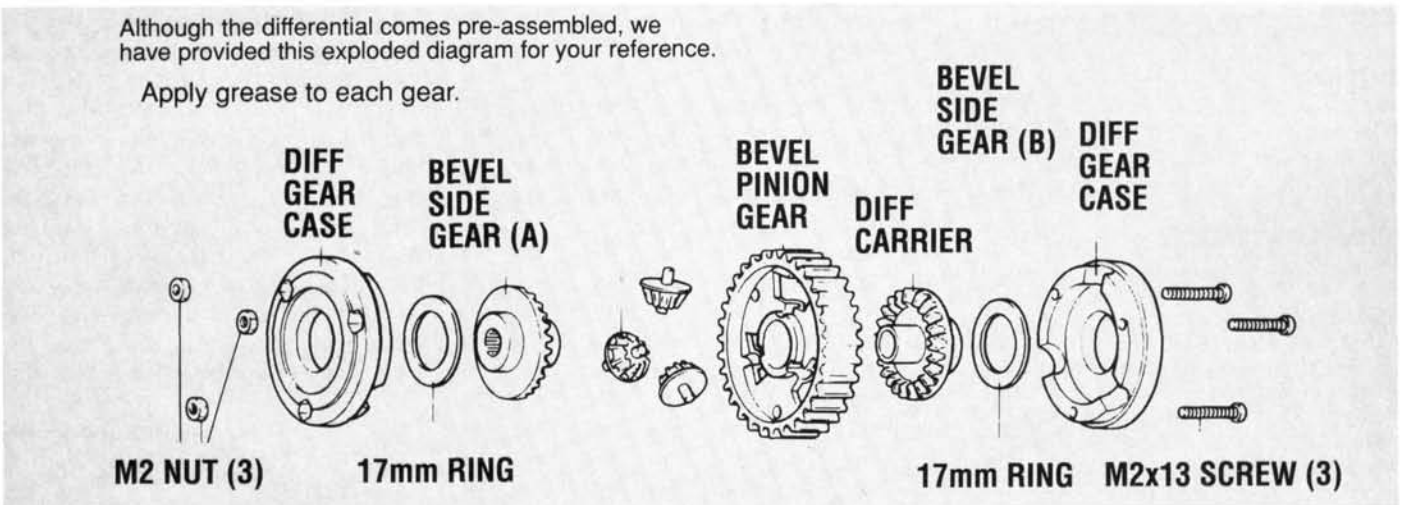
The trim controls are behind a sliding, clear plastic cover that will keep dirt out, and the power meter is large and easily read. The Top Gun can be equipped with rechargeable batteries, and the charger jack is built into the transmitter.



This rear suspension shot shows the familiar Tamiya-style solid rear axle. Certainly not big in the sophistication department, but scores high with the low-maintenance lovers.



The Grasshopper II's radio installation is not only neat, but also well-protected by the tub chassis.



To "tighten-up" on the differential action, the sealed diff can be filled up with grease and reassembled. See text.

TAMIYA

GRASSHOPPER II

Type ..... 2WD off-road
Scale 1/10
Sug. Retail Price $111.95

DIMENSIONS:
Overall Length ..... 16 inches
Width ..... 8.75 inches
Height ..... 5.5 inches
Wheelbase ..... 10 inches
Front Track ..... 7.375 inches
Rear Track ..... 7.375 inches

WEIGHT:
Gross (w/bat.) ..... 47 ounces

BODY:
Type ..... Off-road buggy
Material ..... Injection-molded

CHASSIS:
Type ..... Bathtub
Material ..... Styrene resin

DRIVE TRAIN:
Type ..... Pinion/spur
Differential ..... Planetary gear
Bearings/bushings ..... Plastic

SUSPENSION:
Front: Type ..... Independent A-arms
Dampening ..... Coil spring
Rear: Type ..... Live axle
Dampening ..... Coil spring

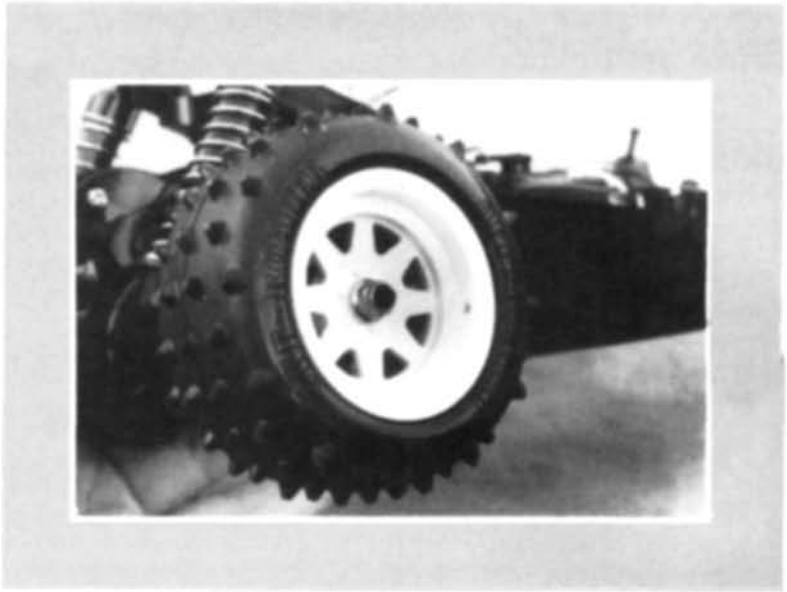
WHEELS:
Front: Type ..... One-piece nylon
Dimensions (DxW) .... 2x.75 inches
Rear: Type ..... One-piece nylon
Dimensions (DxW) ..... 1.75x1.375 inches

TIRES:
Front ..... Ribbed
Rear ..... Knobby

ELECTRICS:
Motor 380
Battery Req'd. 7.2-volt
Speed Controller ..... 3-speed forward w/reverse

OPTIONS AS TESTED:
None

COMMENTS:
Great instructions. Good car for beginners. Would have expected to see a 540-size motor in the improved version. However, a change to the 540 is easily obtained with available after-market parts. Longer A-arms definitely add stability.



The Hopper II's tires work well on medium to loose dirt. The wheels proved strong.

The Top Gun comes with a one-year limited warranty and, if all of them work as well as mine has, it's a radio you can count on.

Though the original Grasshopper has been on the market for a long time, a couple of areas still need attention in the II. For instance, the servo saver is too short, and when a full left turn is made, the right steering arm hits the chassis. In addition, a longer servo-saver arm would tend to keep the front wheels parallel when turning.

If the receiver is installed as directed, it presses tightly against the speed controller and isn't cushioned at all. I snipped off the front lug, which was to be used to secure the urethane band that binds the receiver, then I used servo tape to hold the receiver in place and provide a cushion against sharp jolts.

My most serious complaint is directed against the use of plastic bushings instead of metal bushings. Plastic bushings have no place in a quality car kit, and I can't believe that the cost of metal bushings is so high they can't be added to the kit and reflected in a slightly higher kit price. I think any saving in manufacturing cost is more than offset by the feelings of the buyer when, after a couple of hours running in the dirt, the plastic bushings wear themselves and related shafts so much that the wheels develop a serious wobble and the gears start to grind.

I installed the stock 380 motor that comes with the kit. You can swap to a 540 motor if you want more power, but the 380 has the advantage of a longer run time. On a full battery, my car ran for more than 12 minutes.

I really like the body. Unlike most of the others, it isn't made of clear Lexan, but is injection-molded in white, and all that's required is the application of decals. This doesn't take long, and there's no body to cut out or paint. In addition, the body is sturdy and very resistant to damage.

PERFORMANCE: In the dirt, the Grasshopper handled as you might expect a solid-axle car with non-functioning shock absorbers to handle. It hopped! Maybe that's where the Grasshopper's name came from. But it's a lot of fun, and the simple, straightforward design is trouble-free. For running around your backyard, or for boony bashin', this car is a better choice than a more sophisticated, maintenance-intensive car.

If you're thinking about racing the Grasshopper in an entry-level class (assuming ROAR ever comes out with one), plan to add practically all the hop-up equipment that's available. You'll need the shocks, a 540 motor and probably different front tires. Most of all, this car requires bearings, and it's a lot easier to install them when you build the car than having to go back and put them in later.The Grasshopper II is a fun car based on an old design, but the kit is well-executed. It's still a good entry-level kit, although cars like the Falcon and the Raider are slowly pushing it into the background.

*Here's *the address of the manufacturer featured in this article:*
***MRC/Tamiya,** 200 Carter Dr., P.O. Box 267, Edison, NJ 08818.* ■

NEW ENGLAND INDOOR OVAL

by WALLY DAVID

High-speed carpet cuttin'

ON ARRIVING AT K/N RC Speedway in Stafford Springs, CT, it was obvious that a number of different stories would unfold over the weekend.

The first story was the location of the race. The site for the New England 1/10-Scale Indoor Oval Championships was a former roller-skating rink on the grounds of Stafford Springs Motor Speedway. The full-size track holds Winston Racing Series events, including asphalt modified and stock-car races. Constructed in 1913, the building has a ceiling that's completely free-standing. This suspended ceiling, which is the largest in New England, has no support beams to interfere with the racing activities below. The track and pit space are located on the second floor of the building. On the first floor, there's a refreshment stand serving hot food, beverages, candy and other goodies. Included in the race entry fee were food tickets worth four dollars to be used at the stand.

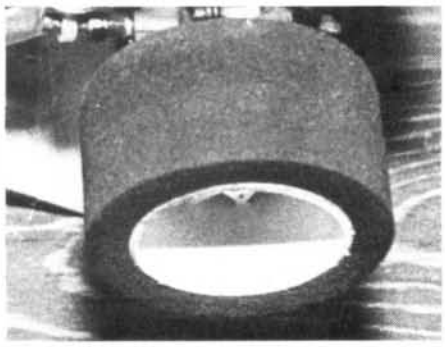
The 100x34-foot carpeted oval, with 4-foot-high banked turns and 12-foot-wide lanes, allowed plenty of passing room while hurtling down the 85-foot straights. The track is deceiving from up on the drivers stand, because the cars don't seem to be moving very fast. However, the speeds created by the high-bank turns and long straights leave very little time to react. It's quite possible to brush the inside of the turn and wind up crashing into the outer wall, taking out other cars in the blink of an eye.

Bruce Throne of Syracuse, NY, was the Top Qualifier and took 1st place in the Off-Road Stock Class.

There was ample pit space, with plenty of electrical outlets to handle the nearly 100 entries each day. Another 100 people could probably have been accommodated on the first floor near the snack bar where tables with electricity were also available. A fully stocked shop is located at one end of the track to get racers back into the action quickly.

Another story that developed concerned the drivers. Competitors came from as far as Buffalo, NY, and southern New Jersey, and there were many

The K/N RC Speedway is an indoor, high-banked 100x34-foot carpeted oval track.



RUBBER RULES!

WHAT'S BLACK, GUMMY, soft, needs no tire-traction compound and seems to last forever? One-eighth-scale gas tires, that's what! When I couldn't get my car to handle well, I set off in search of the key to going fast and having the car stick to the track. Most people told me that the best tires are the yellow compound tires I already had, and they said I should increase the rear-wing angle. But I went to talk to some of the local hot-shoes, and I found that they use some kind of 1/8-scale gas tires. Although these tires aren't cheap—about twice the price of a set of foam donuts—they wear very well, and they resist losing chunks to the wall. One racer has had the same set on his car for over four months!

Most 1/10-scale tires are almost all foam, and the secret of the gas tires is their high rubber content. Since 1/8-scale races are much longer than 1/10-scale, the tires must be able to take the abuse that the heavier fuel-powered cars dish out. Although the high rubber content makes the tires difficult to cut down to size, the results make the hassle well worth the effort. Nova Rossi and Delta both make gas tires that are available in different compounds, so you'll have to experiment to find out what's best for you. ■

drivers from all over New England and southern New York. With no nationally known drivers at the race, the question was, would local drivers familiar with the track dominate those from out of the area?

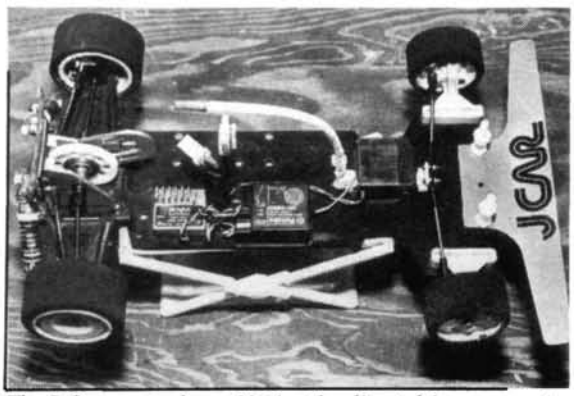
The biggest story of the weekend was the variety of cars on hand, and this was possible because of the openness of the rules. There was no minimum-weight requirement for either the Off-Road Stock (suspension) or the Straight-Axle Stock (pan) Class. Consequently, some of the local pan cars weighed in at only 24 ounces, while most out-of-towners were at the ROAR 42-ounce minimum. The suspension cars (off-road) had similar weight disparities. A lighter car is a faster car. While a lighter car isn't always as stable as a heavier one, being lighter on a high-speed oval is a distinct advantage.

There were all manner of home-built cars. The pan cars ranged from those with TRC front suspensions and BoLINK rear ends, to cars that had so many different components that they were impossible to identify. Some cars were built completely from homemade parts. And yes, there were even some actual box-stock cars, like BoLINK Eliminators, Lucas Agitators, TRC Pro 10s, Lazer Lite Shadows, and Inter-Fab Vipers.

Suspension cars had as much, if not more, variety as the Pan-Car Class. There were a number of Losi JR-X2s, plenty of RC10 hybrids, J Cars, Ultimas, a Tamiya Fox or two, and the ever-popular home-built car.

Because there was no rule governing body type, many styles were found in action. The open-wheel bodies included Indy cars, dirt modifieds (mud buses), asphalt modifieds, supermodifieds, off-road buggies, and even some Parma Hot Rod Hornet bodies (although they weren't used on Hornets). Closed-wheel bodies included NASCAR stock cars, Outlaw wedges, ASA stock cars, GTP cars, sports cars, and Can-Am cars.

Before the drivers had a chance to bang up their bodies, all cars were placed on the track to be judged for the Concours competition. The cars weren't separated into different classes, so when Bob Crescitelli's blue-and-white ASA Camaro was chosen for 1st place, it was quite an accomplishment. Second place went to Andrew Sapoznik's orange and black, chopped



The J Car on-road car. Notice the direct-drive rear motor mount in mid-position, with Kyosho Ultima rear A-arms and dogbones. Up front are Associated 12L blocks.

Ken Meyle of Coatsville, PA, works on his car. His RC10 was the highest-qualifying and highest-finishing RC10 in the competition. He was 6th in the B-main in both the stock and modified off-road classes.

and dropped, stock car. The Pennzoil Indy car painted by Kevin Kudzal took 3rd-place honors.

Under the format of the New England Indoor Oval Championships, the Off-Road Stock (suspension) and Straight-Axle Stock (pan) raced on Saturday. The Modified Classes had to wait until Sunday to race. Using hand-out Race Prep stock motors, the Suspension and Pan Classes ran three qualifying heats and the Main. Most drivers seemed happy with this arrangement, although some used the option to exchange motors if they had a serious problem. All exchanges were at the discretion of the race officials.

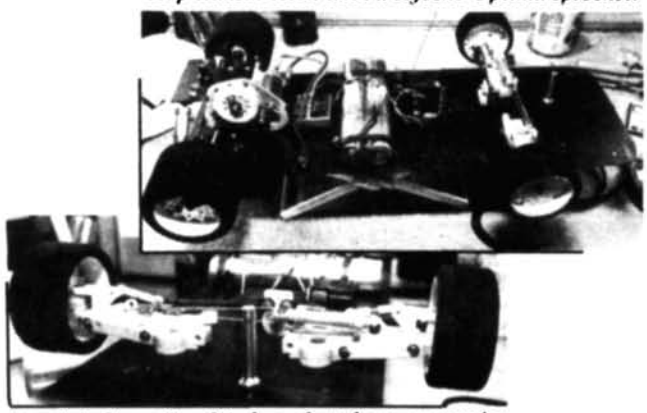
When all three rounds of qualifying had been completed, some interesting things became apparent: No single type of chassis or body style seemed to have an advantage. One car that was conspicuous by its absence from the top six qualifiers in the Off-Road Class was the RC10. Whether this was due simply to driver fancy, or because of car performance, is hard to say.

Grabbing the TQ honors in the Off-Road Stock Class was Bruce Throne of Syracuse, NY. He drove a Losi JR-X2 with a dirt-modified open-wheeler to a track record of 40 laps in 4.045 minutes. Local favorite, Joe Allevo, of Ashford, CT, who was the previous record-holder, qualified in the 2nd spot with his home-built hybrid, covered by a Hot Rod Hornet body. John Grace, one of the "factory" J Car drivers, wound up on the inside spot of the second row, as 3rd qualifier. His J Car sported a stock-car body.

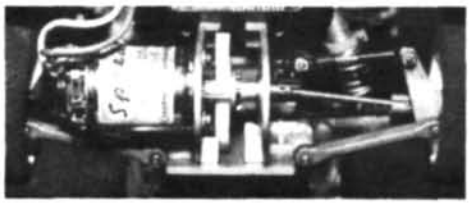
Kenneth Tuttle Jr. of nearby Springfield, MA, put his Indy-bodied, Lazer Lite Shadow on the pole in the Straight Axle Stock Class with 43 laps in 4.022 minutes. Second on the grid was Jeff Miller of Leydon, MA, driving another Lazer Lite Shadow with an Indy body. Making it a clean sweep for Indy bodies was Dan Cantalini of Northford, CT. His home-built Associated car was the 3rd fastest in the class.

It wasn't a safe weekend for track records, as Bruce Throne bettered his hours-old record by over a second, to win the Off-Road Stock A-Main with 40 laps in 4.034. A pair of heady moves enabled the 5th and 6th qualifiers to finish in the top three. As Throne took off from the pole, the 2nd through 4th

Joe Allevo's home-built off-road car featured 1/8-scale gas tires on the front and rear and used a Team Pit Stop transmission with a Kyosho Optima sprocket.



Associated's optional independent front suspension for the 12i is on the front of Joe Allevo's off-road car.



DIRECT-DRIVE DEBATE

WHEN THE J CARS hit the track in the Off-Road Class, there was a lot of grumbling, because J Car, the major sponsor of the New England Indoor Oval Championships, had its very new and very effective Direct-Drive System cars out in force. This system consists of a Thorp ball differential that's directly driven by the motor pinion gear. The output shafts have been modified to use either Ultima or MIP output cups, which turn custom-made dogbones. There's no gear reduction, therefore no transmission, and the system can be used in a pan car, an RC10, or an Ultima.

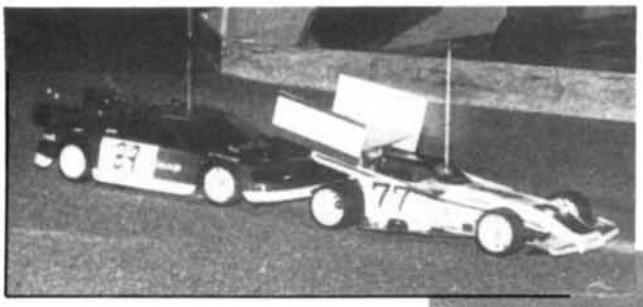
Here comes the sticky part: Because the classes were divided into Off-Road and Straight-Axle, the DDS rear was allowed to run with the cars that had transmissions. While after-market transmissions like those made by Team Pit Stop, Track Master and MIP are more efficient than a stock RC10 transmission, there's still some inherent power loss owing to the number of gears. On the other hand, the DDS suffers no loss at all. This gives it an advantage over the transmission cars, because the DDS rear end gets instant acceleration off the starting line and coming out of the corners.

Apart from the JR-X2s driven by Bruce Throne and Scott Savro, most of the top-qualifying cars had either a J Car rear or a home-built version to achieve direct drive. Many racers felt that the J Car and other direct-drive cars should have raced in the Straight-Axle Class.

On checking with John Thawley, the ROAR National Administrator, I learned that for 1/10-scale on-road racing, ROAR makes no distinction between off-road, suspension, non-suspension, straight-axle, or split-axle cars. The On-Road Class was intended for cars such as the Eliminator, the PRO 10, and the Viper, etc. If a racer wants to show up at the Nationals with a car that wasn't intended for that purpose, that's his option.

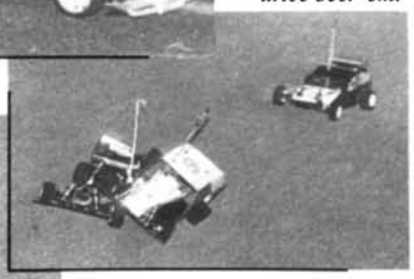
The problems arise when a race promoter wants to open up racing to more people and creates a separate class . Many promoters don't yet know enough about the hobby to decide where the class lines should be drawn. A "suspension class" is meaningless, because some "on-road" cars have three or more oil-filled shocks. Who can say that isn't a suspension? Some standardization of rules is needed, and I think that the best way to go is with a gearbox class (for converted off-road-type cars) and a direct-drive class.

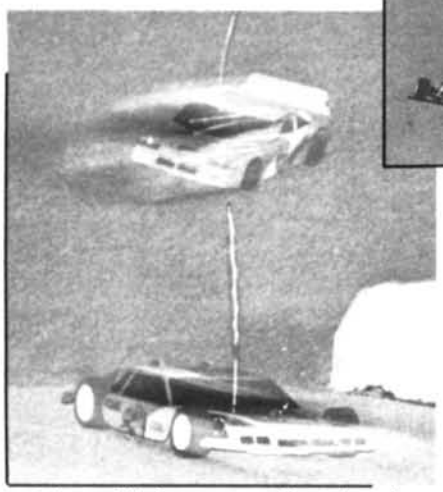
I was assured by Nick Kahl, owner of K/N Raceway, that he intends to come in line with ROAR rules in the future. This will make things fair for racers from outside the area who come to take part in a nationally advertised race. BRAVO! ■



Right: Who says you can't draft with R/C cars?

Below: Open-wheel action in the off-road class. If you can't beat 'em, drive over 'em.





The modified cars were a blur of speed.

cars all tangled going into the first turn. Scott Savro of Syracuse, NY, launching his JR-X2 from the 5th spot, hugged the inside of the first turn and was able to avoid the jumble of cars to get into the 2nd spot. Darryl Poprosky, another J Car driver, pulled a similar move by staying high and sliding into 3rd as the three unfortunates bounced off one another. Poprosky eventually wound up in 2nd, after Savro tangled with a back marker near the end of the race. The top three all finished on the same lap.

The Straight-Axle Stock A-Main was a rather uneventful affair, with pole sitter Kenneth Tuttle Jr. keeping his Lazer Lite Shadow out in front from start to finish. Dan Cantalini moved up from the 3rd spot to take 2nd and Jeff Miller slid back from 2nd to finish 3rd.

As Sunday started, there were some new faces. Because the Stock and Modified races were held on different days, some drivers chose not to attend on both days. I like this setup, because it still allows into the competition people who might have to work on one of the weekend days.

Among the new faces was local driver Andrew Sapoznik, of nearby Windsor Locks, CT. He put his beautifully machined, home-built, direct-drive car on the pole in the Off-Road Modified Class with a track record of 45 laps in 4.032 minutes. A Trinity 15-turn, single-wind motor powered the stock-bodied car. Driving a home-built car with an Indy body, Gary Yelin of Southwick, MA, used a Twister 16 triple to power it to the 2nd starting spot. Scott Savro, who finished 3rd in the Off-Road Stock Class, switched from an outlaw wedge to a dirt-modified body, and he improved his qualifying by two spots from the day before, to start 3rd on the grid. The powerplant for Savro's JR-X2 was a Speedworks 16 double.

Barry Iacovelli of Vernon, CT, was able to capture the pole for the Straight-Axle Modified A-Main with a track record 48 laps in 4.036 minutes. Under the Indy bodywork of his home-built Associated/Delta was a Trinity 13 double. The new face of Hoyte Stacey, from Buffalo,

(Continued on page 172)

NEW ENGLAND INDOOR OVAL CHAMPIONSHIPS

A-Main: Stock Straight-Axle Cars

Finish	Name	Qual.	Chassis	Body Type
1	Kenneth Tuttle Jr.	1	Lazer Lite	Indy
2	Dan Cantalini	3	Home-built	Indy
3	Jeff Miller	2	Lazzer Lite	Indy
4	Bill Henning	6	BoLINK Elim.	GTP
5	Bruce Throne	5	BoLINK Elim.	Stock car
6	Joe Allevo	4	Home-built	Hot-rod Hornet

Top qualifier: Kenneth Tuttle Jr., 43 laps 4.022 Laps 4.022
Winning Laps: 44 Laps 4.004

A-Main: Stock Off-Road Cars

Finish	Name	Qual.	Chassis	Body Type
1	Bruce Throne	1	Losi JR-X 2	Dirt modified
2	Darryl Poprosky	6	J Car	GTP
3	Robert Poage	4	Home-built	Indy
5	Joe Allevo	2	Home-built	Hot-rod Hornet
6	John Grace	3	J Car	Stock car

Top Qualifier: Bruce Throne: 40 Laps 4.045 (New track record)
Winning Laps: 40 Laps 4.034 (New track record)

A-Main: Modified Straight-Axle Cars

Finish	Name	Qual.	Chassis	Motor	Body Type
1	Hoyte Stacey	2	Predator Lynx	Revtec 16	Can Am
2	Bruce Throne	6	BoLINK Elim.	Losi 16	Stock car
3	Joe Allevo	4	Home-built	Trinity 15	Hot-rod Hornet
4	Barry Iacovelli	1	Home-Built	Trinity 13	Indy
5	John Brunelle	3	Home-Built	Trinity 14	Hot Rod Hornet
6	Jim Damerell	5	Vicfor	Trinity	Outlaw wedge

Top Qualifier: Barry Iacovelli 48 Laps 4.036 (New track record)
Winning Laps: 47 Laps 4.034

A-Main: Modified Off-Road Cars

Finish	Name	Qual.	Chassis	Motor	Body Type
1	Joe Allevo	4	Home-built	Reedy Gold Star	Hot-rod Hornet
2	Darryl Poprosky	6	J Car	Quarter Flash	GTP
3	Scott Savro	3	Losi JR-X2	Speed Works 216	Dirt modified
4	Andrew Sapoznik	1	Home-built	Trinity 15	Stock car
5	Garry Yelin	2	Home-built	Twister 16	Indy
6	Bruce Throne	5	Losi JR-X2	Parma 16	Dirt modified

Top Qualifier: Andrew Sapoznik, 45 Laps 4.032 (New track record)
Wining Laps: 44 Laps 4.019

RC10 TORPEDO

(Continued from page 88)

"driveable" motor that starts out strong and keeps getting stronger.

To keep the motor cool, there's a Trinity heat sink/spacer between the motor and the mounting plate. The aluminum heat sink draws some of the heat from the motor, but its most important function is allowing air to flow through it. Air is scavenged through slots machined on the side of the heat sink, which faces the motor, and this significantly reduces the operating temperature.

On the side opposite the motor heat sink is the most crucial element in the overall performance of your RC10: the transmission. Without a smooth transmission and differential, all the motors and batteries in the world won't get your car across the finish line ahead of the competition. There are a number of after-market transmissions available for the RC10, and each has merit, but to keep costs down, the stock tranny can perform just as well with a little elbow grease and considerably less green, compared to the cost of an aftermarket replacement .

Before assembling the tranny, I took each of the metal gears and polished every tooth with a Dremel Moto-Tool and a rubberized polishing wheel that looks like a grinding stone. The wheel has a very fine grit that prevents you from removing too much material, but it will take off the rough edges. It's most important to pay attention to the edges of the teeth where burrs are most common. These edges can be smoothed with the wheel that was used to polish the teeth. This might sound like a lot of work, but when you see the difference in performance, you'll agree that it's time well-spent.

Trial-fit the gears on the aluminum plate and see that there's no interference or binding. If the gears still bind and you're confident that all the burrs have been removed, remove the gears and

(Continued on page 118)

Track Report

SECOND LOOK SERIES

MRC / Tamiya

Boomerang 4WD

THE MRC/TAMIYA* BOOMERANG is the baddest off-road, four-wheel-drive machine goin' and you can take that to the bank, or the flats, or the dunes!

This newest Tamiya release should put Model Rectifier Corporation just behind GM and Ford in number of different type vehicles produced. In fact, it may put them in front! Those of you off-roaders who haven't yet tried four-wheel drive will be amazed at this machine. It's pure killer!

THE KIT. The kit contents are nicely packaged and small parts are neatly bagged. The last three pages of the 24-page illustrated assembly manual are a parts list/locator, which makes identifying all the components a much easier task. The illustration even tells you which parts are *not* required.

Assembling your Boomerang doesn't require much in the way of tools; some screwdrivers, pliers, and a hobby knife are what Tamiya recommends. You'll need some Super Glue to anchor the tires to the wheels. I used Pacer's* Flex ZAP, but any of the glues will work just fine. A tube of switch lubricant and oil for the oil-filled shocks are even included in the kit, along with a full sheet of stick-on, thin film decorations to trick out your 'rang.

ASSEMBLY. Construction will take you a couple of evenings, but goes swiftly due to the great instructions and near perfect parts fit. In order to test the instructions, everything on this kit, except the body painting, was done by my in-laws, George and Wilma Nail. They work well together and were constantly apologizing for taking all my fun away.

We didn't lose any time during assembly and you won't either, if you have your radio available as you're building. Most servos will fit with no problem, but there isn't a lot of room for the battery

pack supplied with the radio. The design of the Boomerang favors the use of the propulsion (7.2V) battery pack to supply both motive power and electronic equipment power. This increases performance by saving the weight of the extra pack and is accomplished by using a Battery Eliminator Circuit (BEC). Order the proper one for your radio equipment unless your receiver already has one.

I used Altech Marketing's* Acoms Technisport AW-75R two-channel radio in the Boomerang and it's the first trigger/wheel type car radio I've used; all my other cars have conventional "two-stick" systems. The car-type radio is really the way to go, since it seems more comfortable and the wheel is more realistic to use. This model Acoms has some really nice features, such as servo-reversing and variable-rate servo throw. The grip is even reversible to accommodate us "lefties."

While the Nails were doing the "tough" part, I trimmed the two clear polycarbonate parts (main body and rear wing) in preparation for painting. I washed the parts in warm water and detergent, dried them, masked the windows, lightly sanded them on the inside with 400-grit sandpaper, rewashed and dried them, and was set to paint.

The reason for the light sanding is to create a "scuffed" surface, which allows the paint to adhere better. Since the body is painted from the inside, nearly any kind of paint can be used. It will all result in a deep glossy finish, since you're actually looking through the clear body at the paint. The big advantage is that the finish remains attractive after repeated "bashings," which are likely. I airbrushed the colors (blue and white) in a frosted pattern, applied the stick-on decorations, and attached the body to the chassis that George and Wilma had already completed. They informed me that they had no difficulty, even though there were two gear boxes to assemble.

They liked the fact that two pinion gears are supplied, a 15-tooth and a 13-tooth, for varying course conditions. Tamiya also offers 14-, 16-, and 17-tooth pinions as options.

They also liked that the three oil-filled shocks are "on car" adjustable for stiffness. They use spacers to vary the throw and compression limits.

RUNNING. When all assembly and painting were done, it was time to head off-road to let Boomerang strut its stuff! George and I headed for my local torture/test area, which has relatively smooth but loosely packed dirt. After taking some "pretty" pictures, I briefed George on an imaginary track, which we decided would be good to test the handling of the car. We tried some straight-line acceleration runs and were really impressed, especially since this was an out-of-the-box, non-ball bearing, stock RS-540S-motored kit. It's really neat to see dirt getting sprayed back from each of the four wheels. As impressive as that was, the Boomer' really came on when we started doing some tight figure 8s. This maneuver lets you see if your shocks are functioning equally, because you're doing left and right turns (circles) back to back. Even in the loose dirt, it stuck like glue, and kicked up so much dirt that it was frequently obscured by a dust cloud!

After getting used to the car, we found that we could do some of the slickest 180° reversals since those seen on "A Team" by applying full-power reverse when going forward. The final series of tests came over some really rugged, but open terrain. Given enough room for acceleration, the Boomer covers a good portion of the landscape *airborne!*

(Continued on page 111)

BOOMERANG UPDATE

by STEVE POND

EARLY IN 1986, the Tamiya Boomerang was introduced as an updated version of the Hot Shot 4WD, which had been very successful, but was falling prey to newer technology. The updated Boomerang included new, oil-dampened shocks that smoothed the ride considerably. (These shocks are still used on Tamiya's new cars.) The upright configuration of the new, rear, oil shocks took the hard bumps much better than the Hot Shot's inadequate mono-shocks.

Tamiya expected this car to make a big splash on the off-road scene, but stardom wasn't in the cards. Although the Boomerang proved to be one of the hottest four-wheelers of the time, a few factors kept it out of the spotlight.

While the Boomerang was clad with a number of improvements, the chassis design was the same. This type of chassis requires about *five minutes* of removing screws for something as simple as a frequency change, but, on the the positive side, it prevents most dirt and debris from coming into contact with the radio system. This made the Tamiya car more economical to run when it came to keeping the radio gear intact, but consumers seemed to feel that the longevity of the radio system was secondary to speed and performance. Another factor that limited the Boomerang's success was the introduction of the Kyosho Optima line of 4WD cars. This line eventually developed into the Turbo Optima, which changed the face of 4WD racing.

Combining both performance and durability, the Boomerang is still experiencing some success at local racing levels. Although it doesn't go as fast as the high-dollar racing machines, it isn't on the workbench nearly as often. In 1988, Car Action chose the Boomerang as the best entry-level 4WD off-road car, and it's still a solid car for the first-time 4WD buyer. ■

Nothing seems to stop it. If the tires can bite, it keeps going, often better than some of the chain-drive 4 WDs I have.

This Tamiya offering is their best yet and worth its price tag. Performance can be improved with the addition of the optional ball bearings and a number of trick motors, but even in stock form, it's a killer. Tamiya will have to go some to top this one.

Although the kit is fun to assemble, the end of the assembly process is really the *beginning* of the big-time fun—the running and racing. I suggest, however, that you purchase an extra battery pack and a quick charger when you buy your Boomerang; you won't want to sit still while waiting for the battery to recharge!

**Here are the addresses of the companies mentioned in this article:*
MRC/Tamiya, *200 Carter Dr., P.O. Box 267, Edison, NJ 08818.*
Pacer Technology and Resources, *1600 Dell Ave., Campbell, CA 95008.*
Altech Marketing, *Inc., P.O. Box 286, Fords, NJ 08863.* ■

SECOND-LOOK SERIES BUYER'S GUIDE

The fact that after-market companies, big and small, are still producing and developing high-performance hardware for the Boomerang speaks in favor of the car. Everything from ball diffs to twin-shock conversion kits are available. With these parts listed below, your Boomerang can go on to enjoy A-Main action at the local track.

TAMIYA

BOOMERANG

Type ..... Off-road
Scale 1/10
Sug. Retail Price $223.95

DIMENSIONS:
Overall Length ..... 15 1/2 inches
Width ..... 9 1/16 inches
Height ..... 6 1/2 inches (to rear wing)
Wheelbase ..... 10 1/4 inches
Front Track ..... 8 1/4 inches
Rear Track ..... 7 3/4 inches

WEIGHT:
Gross (without battery) ..... 42 ounces

BODY:
Type ..... Buggy
Material ..... Lexan

CHASSIS:
Type ..... Monocoque/tub
Material ..... ABS resin

DRIVE TRAIN:
Type (pri./sec.) ..... Pinion-spur/shaft
Differentials ..... (Two) Planetary gear
Bearings/bushings ..... Plastic

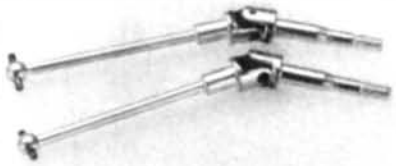
SUSPENSION:
Type (f/r) ..... Upper & lower A-arms
Dampening (f/r) ..... Oil-filled coil-over shocks

TIRES:
Front ..... Block oval/spike
Rear ..... Block oval/spike

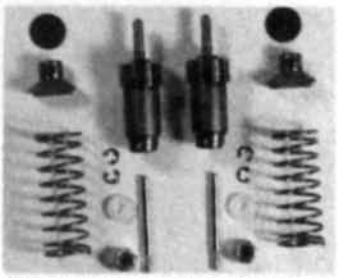
ELECTRICS:
Motor ..... RS-540 Mabuchi
Battery Req'd. ..... 7.2V flat pack
Speed Controller ..... 3-step forward/reverse

OPTIONS AS TESTED:
None

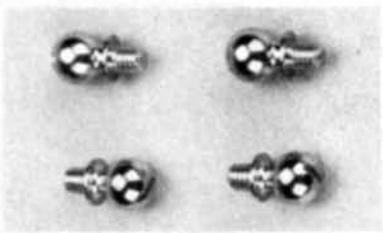
COMMENTS:
The Boomerang remains one of the most popular 4WD cars for the budget-minded. Sway-bar connecting arms flex, decreasing effectiveness. Conversion to a two-shock system with Thundershot components greatly improves handling.



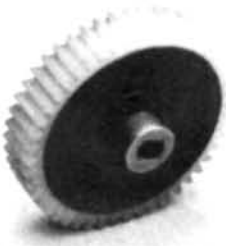
If you're tired of losing your Boomerang drive shafts (or dogbones), these new, universal drive shafts from Hobbico will be a welcome addition. These drive shafts, made exclusively for Tamiya cars, combine the axle and drive shaft into a single unit, eliminating the possibility of the dogbone falling out.



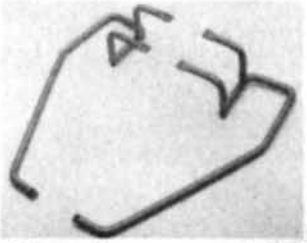
This You-G shock set from Andes Hobbies converts the stock Boomerang front monoshock to two separate upright shocks for superior independent suspension. Also available is a rear damper set that replaces the stock plastic shocks with more durable, aluminum shocks.



These CRP front-suspension pivot balls are designed as a direct replacement for the stock Tamiya aluminum pivot balls used on the Boomerang. The superior strength of these steel pivot balls will reduce the chance of breakage and premature wear. They'll also fit the Hot Shot, Super Shot and Big Wig.



To replace the bevel-gear differentials in the Boomerang, Dialed Racing has come up with a set of replacement ball differentials. These ball differentials allow much smoother operation, which results in better handling and faster lap times.



To protect your Boomerang against side impacts, roll-overs and from tangling with other cars' wheels, Pro-Trac offers this durable pair of aluminum nerf bars. The set features strong, round-bar construction. Installation instructions and all necessary hardware are included.

To allow for quick suspension adjustment without having to carry around a collection of stock spring spacers, CRP has designed an adjustable coil-over clamp specifically for the Tamiya yellow plastic shocks. For infinite adjustability, simply use in place of the original spacers.

There's a cure in sight for Boomerang owners who've had their factory bumper and underguard break repeatedly. You-G now manufactures a heavy-duty front underguard and mini bumper that's considerably more durable than the factory equipment. The underguard is constructed of high-quality aluminum and the bumper is of strong but flexible ABS plastic.

To improve the handling of your Boomerang, Parma offers this unique anti-roll bar that fits without any modifications. The anti-roll bar is completely adjustable to suit any track conditions. It comes complete with all necessary hardware.

OFFSET RC10 MODIFIED

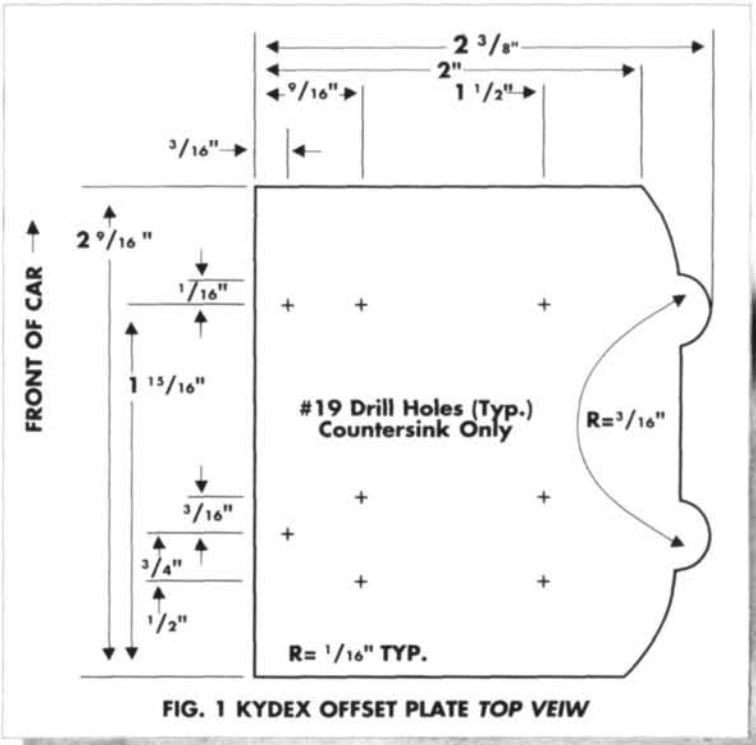


FIG. 1 KYDEX OFFSET PLATE *TOP VEIW*

THE 1/10-SCALE OFF-ROAD Carpet Oval Class at my local R/C track differs from those of the national sanctioning bodies. Last year, the track rules for this class were that cars must fit ROAR dimensions and must use a stock motor, a maximum of six cells and a chassis designed for off-road racing. With these rules in mind, I built a car for this class. On an Associated* RC10 chassis, I installed a BoLINK* Invader front and rear suspension and drive train. No one complained about the car until my driver's ability increased so much that he consistently beat the track regulars. After a hasty technical inspection, the car was disqualified.

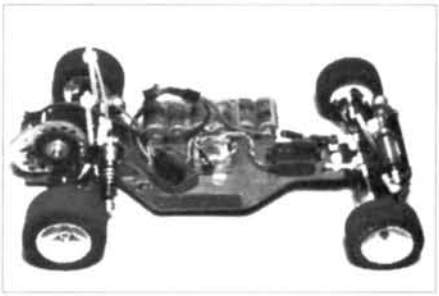
This year, in addition to last year's rules, cars racing in this class must use an off-road-based suspension and 1/10-scale wheels. To still give my driver an advantage, I researched oval-car racing suspensions and found that, in the '60s, Indy-style cars used right and left suspension components of different lengths to offset the body center line relative to the wheel-track center line. I then tried to see how to do this to an off-road chassis.

I started the conversion by adding a stock-width graphite composite nosepiece to a Hot Trick* chassis. A McAllister* lowering kit provided the shock towers and mounting hardware for the shock absorbers and springs. I offset the chassis by using the stock, left, front A-arm and an Andy's* right front A-arm. The Andy's arm is 3/8 inch wider than a stock A-arm; it also lengthens the right wheelbase by 1/8 inch, so it offsets the chassis 3/16 inch to the left of the wheel-tread center line. I made a Kydex plate that mounts under the differential and moves the right rear suspension mount 3/8 inch to the right (see drawing), so that the chassis center line and the wheel-tread center line are parallel. (Depending on the success of this design and the durability of the Kydex, I might have to make the rear mounting

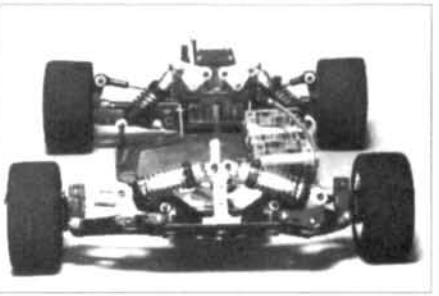
OPTIMUM OVAL PERFORMANCE

by CARL HOETZL

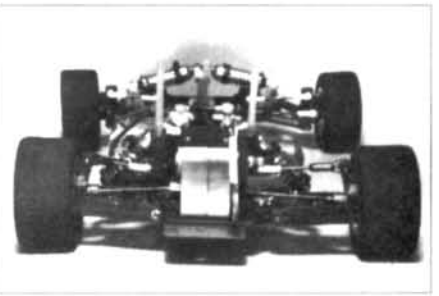
Full-scale oval track racers have used offset chassis designs for years. Why can't R/C mechanics do the same?



Hoetzl's RC10 used a flat Hot Trick chassis for oval-track racing.



McAllister's lowering kit was used front and rear. An Andy's A-arm was used on the right front, while the shorter stock A-arm was mounted on the left side.



The Kydex chassis plate provided the offset for the rear of the car. A modified Boomerang dogbone was used in place of the standard unit.

plate from a stronger material, e.g., graphite or fiberglass.) From a Tamiya* Boomerang dogbone, I machined a longer right dogbone. The full-width chassis allows me to place the batteries to the left for weight bias, just as they do on full-size racing cars.

The dynamic weight transfer of an R/C car follows the same principles of physics as full-size cars, so it should be set up accordingly. The major concern of race-car mechanics is how well the car handles in turns. When a full-size car slows for a turn, weight is transferred forward, and some of the tractive force of the front tires is used for braking, so it's lost from cornering tractive effort. In 2WD R/C cars, there are no front brakes and virtually no cornering traction is lost to deceleration. Once the car has entered the curve, there's a weight transfer to the right.

Ideally, your car should be set up so that all four tires provide equal tractive force. For oval-track racing, you should pre-load the left rear and right front tires. Offsetting the center line of the chassis, as I've shown here, is one good way to increase weight on the left rear tire. Usually, a stiffer spring is used on the right front coil-over to handle the extra weight transfer going through the turns. Since all braking should be finished *before* entering a turn, you should begin accelerating immediately upon *entering* the turn. The acceleration transfers weight to the rear and reduces the rear tire's available cornering tractive force, because some of this force is used for acceleration. This last weight transfer can cause oversteer as the car comes out of the turn and back onto the straight.

Since there are different coefficients of friction between tire compounds and track surfaces, practice on the track and try different spring rates, shock-absorber oil weights, battery placements and tire compounds to arrive at a setup that gives you a winning combination.

**Here are the addresses of the companies mentioned in this article:*

Associated Electrics, *3585 Cadillac Ave., Costa Mesa, CA 92626.*

BoLINK R/C Cars, *420 Hosea Rd., Lawrenceville, GA 30245.*

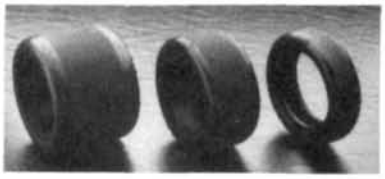
Hot Trick Racing Cars, *1157 Cushman Ave., San Diego, CA 92110.*

McAllister Racing, *2205 First Street #107, Simi Valley, CA 93065.*

Andy's R/C Products, *466 W. Arrow Hwy., Unit K, San Dimas, CA 91773.*

MRC/Tamiya, *P.O. Box 267, Edison, NJ 08818.*■

WHAT'S NEW



IMEX ROAD DAWG

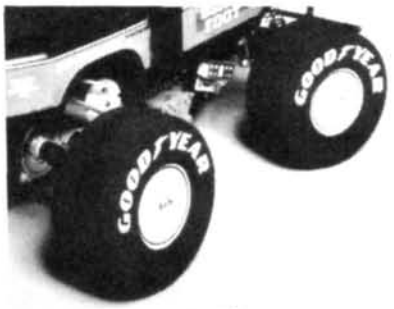
These new Imex Road Dawg slicks are designed specifically for Bru-Line Super System 1/10-scale wheels. Molded of pure rubber, these tires offer superior traction with minimum wear, and they're available at a very affordable price.

For more information, contact Imex Model Co. Inc., 53 Trade Zone Ct., Ronkonkoma, NY 11779.

TEKIN SCE CHARGER

Designed for SCE cells, this charger uses a soft, low-level output pulse that will make your cells take more charge and put out more power, much like SCR Cells. Your cells will also last many more cycles and stay better matched. If you currently use a charger with a "hard" pulse (high-peak current output) or "turbo" boost, switching to this charger will produce a noticeable improvement. The BC 100 S is a 1- to 9-amp charger with a switch to select output pulses for either SCE- or SCR-type cells. The charger is TempFET-protected to prevent sticking caused by overheating, and it uses either a 12V battery or a 12V automobile battery charger as the supply.

For more information, contact Tekin Electronics, Inc., 1027 Trepadora, San Clemente, CA 92672.



AJ'S MEATBALL HUBCAPS

AJ's new Meatball Hubcaps are designed for use with 2.2-inch monster-truck wheels. As well as looking stylish and aerodynamic, these hubcaps prevent dirt or debris from building up inside the rim, so they'll keep your rims looking new.

For more information, contact Twinn-K Inc., P.O. Box 31228, Indianapolis, IN 46231.

TEAM HAMMER RACING CLASS TEES

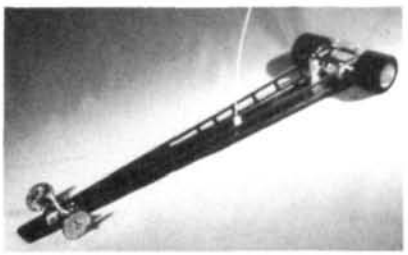
Team Hammer Racing Class Tees are high-quality, silk-screened T-shirts with exclusive racing-class designs. These highly colorful prints were created by the R/C fanatic, Rick "The Hammer" Houle, and they reflect the zany, fun aspect of this popular hobby. All designs are Team Hammer originals, and the artwork is extremely detailed and authentic. The quality of screen printing is backed by Rick's 12 years of experience as the original artist for Ocean Pacific Screen Prints. The more popular scales and classes of R/C car racing are represented in the Team Hammer screen-print line, and more designs are added all the time.

For more information, contact Team Hammer, 12922 Harbor Blvd., Suite 574, Garden Grove, CA 92640.

PRO-LINE STRIKER I AC-51

The Striker I AC-51 is Pro-Line's new hard-pack, oval-track or pavement, special tire. A great action tire with that real-tire look, the Striker fills your front- or rear-tire needs for 2.0- and 2.1-inch-diameter wheels.

For more information, contact Pro-Line, P.O. Box 456, Beaumont, CA 92223.



HOUGE ENTERPRISES 1/10-SCALE DRAGSTER

Houge Enterprises introduces a 1/10-scale dragster that will revolutionize the R/C drag-racing field. Prototype models were extremely successful at the Fall Nationals in Orlando, FL, qualifying and winning the top-fuel and econo-rail classes and setting track records. Houge Enterprises took a totally unique design approach to produce a dragster for serious racers that's sold in kit form and includes everything except electronics. Designed and manufactured using state-of-the-art computer-controlled equipment to ensure the highest-quality components, this car features: an extremely rigid chassis, front to rear, with optimum torsional flex implemented in a descending-channel chassis dragster (DCCD); an aluminum-tipped graphite pro axle; a complete ball-bearing set; a body; and all the hardware necessary for assembly.

For more information, contact Houge Enterprises, Inc., 2400 Sand Lake Rd., Orlando, FL 32809.

Descriptions of new products appearing on these pages were derived from press releases supplied by the manufacturers and/or their advertising agencies. The information given here does not constitute endorsement by **Radio Control Car Action,** nor guarantee product performance or safety. When writing to the manufacturer about any product described here, be sure to mention that you read about it in **Radio Control Car Action.**

COMPOSITECRAFT GRAPHITE MOTOR PLATES

CompositeCraft now has ultralight graphite motor plates for the Associated RC10 and the Team Losi JR-X2. Three times lighter than the original aluminum plates, these new motor plates are designed as direct replacements and are manufactured with a high-quality carbon-fiber composite.

For more information, contact CompositeCraft, Inc., 2400 Sand Lake Rd., Orlando, FL 32809.

PARAGON NUMBER SHEETS

If you want a new look in numbers for your car, here's a fresh alternative. Paragon's Number Sheets not only have enough numbers to outfit four cars, but each sheet also has smaller numbers for wings, air dams and all those areas where larger numbers won't fit. Bordered with white, each number is ROAR-legal, and finishing touches for concours windshield wipers, fuel ports, screening for ducts and assorted Paragon logos are also included.

For more information, contact Paragon Racing Products, 8802 Knollwood Dr., Eden Prairie, MN 55344.

FUTABA 2PB/MAGNUM SPORT 2

Futaba's newest and most affordable pistol-grip system is the perfect radio for the beginner or novice R/C car enthusiast. The 2PB/Magnum Sport system features an all-new, full-size transmitter that's designed for comfort. The T2PB transmitter's clip-style dry-cell battery case is located in the handle for balance, and precision trip adjusters for both throttle and steering are conveniently located for quick tuning. Servo-reverse switches for simplified installation are also provided.

The Magnum Sport system includes the R102JE 2-Channel/BEC receiver, which uses SMT (Surface Mount Technology) to reduce its size and weight, so it's ideal for R/C car use. (It's actually 25 percent smaller and 35 percent lighter than the unit it replaces.) Efficiency and resistance to shock and vibration are improved as well.

Two versions are available: The standard system includes two S148 servos, while the Magnum Sport ESC includes one S148 servo and a Futaba MC112B electronic speed control. The Magnum Sport is available on 27 and 75MHz surface bands.

For more information, contact Futaba Corporation of America, 4 Studebaker, Irvine, CA 92718.

PACTRA CAR RACING FINISHES

Stay out in front on the fast track with 11 new colors of R/C Car Racing Finish from Pactra. Candy colors, fluorescents, metalflakes, black metallic and white pearl join this proven lineup of tough finishes that bond chemically to Lexan (polycarbonate).

New masking tapes and trim tapes round out one of the most comprehensive lines of R/C finishing products. Available in four sizes, Pactra Masking Tape is a flexible, sharp-line, paint mask that prevents edge buildup. Pactra Trim Tape is an ultra-thin, colored film for custom striping and detailing, and it's available in 10 colors, with eight widths on one master roll. Pactra Masking and Trim Tapes are for R/C cars, planes, boats, rockets and all types of plastic models.

For more information, contact Pactra, 420 South 11th Ave., Upland, CA 91786.

PARMA DECALS

Parma adds six new decals to its extensive lineup of multicolor concours-winning products: Sunoco, Campbell's Soup, Wiseco, Texaco, Zerex and Purolator.

For more information, contact Parma, 13927 Progress Pkwy., North Royalton, OH 44133.

RC10 TORPEDO

(Continued from page 106)

unbolt the drive-gear pivot. With a round file, carefully file the lower side of the hole slightly to open up the clearance between the drive gears and the idler gears. You don't have to remove a lot of material; just enough to ensure smooth operation.

The only addition to the stock tranny is a Team Pit Stop* diff kit that replaces the stock thrust bearing and diff tube. The TPS thrust bearing is similar in configuration to a standard, unflanged bearing, but, according to TPS, it can handle much higher lateral loads. Instead of bearings, the diff tube uses ceramic-impregnated Teflon bushings, which should transmit the power more evenly to both wheels. The outer side of the diff tube is machined down to allow the use of a bearing inside the spur gear, and this reduces drag on the diff tube to a minimum when the diff is working.

Choosing gears for the RC10 can be just as confusing as choosing the aforementioned parts, but I've had most success with the Robinson Racing* 48-pitch, machined, spur-and-pinion gears. Most of the popular gears will work well, but

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RC10 TORPEDO

(Continued from page 118)

when you get down to the nitty gritty, the tolerances that are kept with the machined gears are unbeatable.

With the TPS kit installed, the tranny was assembled, and the result was amazing. When I sprayed a stream of air onto the spur gear with a can of Dust-Off, the tranny began to spin so fast that it sounded like a motor connected to an 8-cell pack.

With the work essentially complete, all you have to do is add a Lexan body and charge the batteries, and you can then set your sights on the A-Main.

Covering the RC10 is the new Renegade Stage II body from Andy's. This sharp-looking body conveniently fits the outline of the Trinity chassis to prevent excessive dirt from contaminating the innards. To save your weary hands from any additional labor, this body can be bought pre-painted (as this one was) by some of the most capable painters in the industry.

In addition to the body's aesthetic features, there's an added bonus: By cutting out the front of the scoop on the roof, for additional cooling, a steady flow of air is directed to the speed controller that is located on the shock tower (which should otherwise be mounted on the chassis plate for improved cooling) and the motor. To provide some downforce, my RC10 was fitted with a Bud's* Mini Bi-Level Wing fastened with Bud's horizontal wing mounts. The wing mounts offer no direct performance advantage, but they do keep the wing locked in place with a setscrew. (When you lose your wing as a result of the stock wing mounts' inadequacies, you'll see the advantage of this.)

The power for my RC10 was provided by Trinity-matched 1700mAh Sanyo SCE 7-cell packs. (Yes, these are *matched;* it *is* possible to solder them in a stick configuration.) To get the power to the speed control, the batteries were wired with Astro's* 14-gauge wire. This silicone-insulated wire has hundreds of fine wire strands, which not only make it more flexible and less likely to crack, but it also transmits the power with virtually no resistance. While the 1700s are more costly and delicate than the bulletproof 1200 SCRs, they do provide the additional horsepower needed to get you to the front of the pack, and according to charging lore, you might need *more* than a couple of packs. The 1700s shouldn't be used more than once a day, and that could

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RC10 TORPEDO

(Continued from page 124)

cramp your style if you have to run three qualifiers and a Main.

While doing the research for this article, I discovered that Tekin has just introduced its new BC100S soft-pulse charger, which is designed for use with the new 1700 SCEs as well as 1200 SCRs. The pulses used to charge the battery are now reduced to a significantly lower amperage with no reduction in total charging time. This will make it easier on the batteries and, according to Tekin, will reduce the waiting period between runs with the 1700s and produce better performance, to boot. A dual range switch is located on the left side of the charger for charging both types of cells. In the low range, the maximum output is 4.5 amps which is ideal for SCEs. The high range has a maximum output of 9 amps for the SCRs. While we haven't had a chance to test the effect of this new breed of charger and how it will effect the performance of

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ELIMINATING RADIO GLITCHES

PART 2

by DONALD AMBERGER

Eleven practical ways to prevent glitching

LAST MONTH, we began to look into the causes of radio glitches and possible ways of preventing them. As I previously stated, electronics that fail to operate perfectly all the time aren't acceptable. This month, I'll describe the practical solutions that can be used by every R/C racer to prevent glitching problems.

Glitches Defined

Here's how we defined a glitch last month: In the electronics industry, a glitch is defined as any event that takes place over a short period, affects the desired results and can't easily be repeated. For us, a glitch is a false electronic signal caused by a brief surge of power, and although it's a relatively minor technical problem, a glitch can really ruin your day.

Solutions to Glitches

Here are 11 preventive steps you can take to avoid the various types of glitches in your R/C car. If your car is already up and running, it will take a little more work to make it glitch-proof than if you're just starting to build it. Take the time to do it right at the start, and avoid the hassles of having to repair glitch-induced damage while de-glitching your racer.

• **Arcing of the motor** causes unwanted radio-frequency interference (RFI). The most obvious cause of this RFI is that the motor armature rotates on the brushes and makes and breaks a highly inductive current path. This breaking generates radio frequencies that could bother the receiver. Simple precautions, taken ahead of time, will suppress this source of glitches. If they weren't supplied with your motor, you'll have to buy a 47mfd (micro-farads) at 25V DC (direct current) electrolytic (or tantalum) capacitor and two .01mfd at 100V DC ceramic capacitors. You can pick these items up at a local Radio Shack, or at almost any electronics parts store. Use sleeving, and solder these components to your motor as shown in Figure 1. Keep the component leads as short as possible so they don't flop around, and apply liquid solder flux to the spot on the motor case to which the capacitors will be soldered. Using a soldering iron, solder one lead of the .01mfd directly to the motor case and the other to either the positive or negative terminal. A solder gun should be avoided, because it can't hold temperature as well as an ordinary soldering iron can, and it could cause a "cold" solder joint.

• **Improper length of antenna** causes a desensitized receiver. The length of the antenna is critical. The Futaba* receivers require that the antenna be exactly 39 inches. The length is critical, because at 75MHz operation, a quarter-wave length is 39 inches. That is, for maximum receiver sensitivity, the antenna must be exactly 39 inches. Don't cut it for any reason. Other manufacturers, e.g., Novak*, use a base-loaded approach for their receivers. The antenna length for a Novak receiver is 18 inches. Again, do *not* cut this.

• **Improper routing of antenna** also desensitizes the receiver. Receiver manufacturers will often tell you explicitly in the instructions that the antenna must be kept away from the metal or graphite chassis because it's RF conductive. The antenna wire from the receiver should be routed from the receiver, up and away from the chassis and up the antenna mast. For long antennas, (which you will *not* cut), rather than wrapping all the lead around the antenna mast, build an antenna loom to take up the excess length. Figure 2 shows a simple loom that neatly holds the extra wire in place. Note that the wire isn't looped over itself. Make the loom from a sheet of modeling plastic, or you could even use cardboard. However the antenna is routed, remember that it should be kept away from the chassis as much as possible.

• **Improper lead lengths and lead routing.** Some controller manufacturers specify the importance of the length of the wiring from controller to receiver, servo to receiver and controller to motor. Using leads that are too long can result in glitches and a sloppy layout, since the excess leads will have to be looped and tied together. To avoid this, plan to have just enough wire, with a small amount extra for slack.This slack, or service loop, should be just long enough to allow the removal of the receiver, servo, or control-

ler without straining any connection.

One way to shorten leads is by cutting the cable supplied with the receiver, servo or controller. When the lead has been cut to the correct length, splice it back together, as illustrated in Figure 3.

The *best* way to shorten leads is by opening up the receiver/controller/servo, but be advised that modifying an electronic component might void the manufacturer's warranty. Find the points where the leads end. Carefully mark where each wire is connected, unsolder it, cut it to the correct length, and reconnect it to the spot whence it came. If you aren't too confident about doing this kind of delicate electronic surgery, ask for help at your club or hobby shop, or enlist the aid of an electronics-tinkerer friend. Using *short* leads will make a neat wiring package for your car, but what's more important is that you'll help to eliminate the glitches caused by excessive lead lengths.

• **Unreliable connectors and fuses.** Connectors are surely the most unreliable elements in the electrical system, and unreliable connectors frequently produce glitches. I've seen cars glitch when the real problem was an intermittent connector contact. Not only are these problems tough to find, they're also a pain to repair at the track. A racer doesn't want intermittent operation in his electrical system: He needs a *very reliable* connector that needs no maintenance and is 100-percent dependable. He has to have 100-percent confidence in his connectors. Look around your track; find out who's using which type of connector, and find out which is best for you.

At Island Hobby Racing, most of the racers use Deans plugs, although some use the new Losi* type. Both types are rugged, handle heavy current, are inexpensive, reliable and maintenance-free. If one ever fails, replacement is simple.

In lieu of connectors, I know of several racers who use directly soldered connections in conjunction with small screw-type terminal boards, which are available at your local electronics store. Terminal boards and direct-solder connections are the most reliable, but this direct-connection approach can be inconvenient at the racetrack.

During races, fuses are probably the next most unreliable components. Fuses are something of a puzzle, because, in my experience, the 30-amp fuses supplied with controllers are invariably of a lower value than those for which the controller is rated. I've found that fuses blow in the middle of a race, where a higher rating should have been used. Fuses rated at more than 30 amps aren't available in the blade style.

Some manufacturers (e.g., Tekin*) claim that their new controllers don't need fuses, and most racers at Island Hobby don't use them. Only a few racers there have actually smoked controllers by omitting a fuse. On the other hand, fuses are one more unreliable element, and racers want reliability. One of my fuses separated inside the fuse package for no good reason, and this resulted in a DNF and a fast fuse-replacement job. Fuses should be eliminated, but you should be fully aware

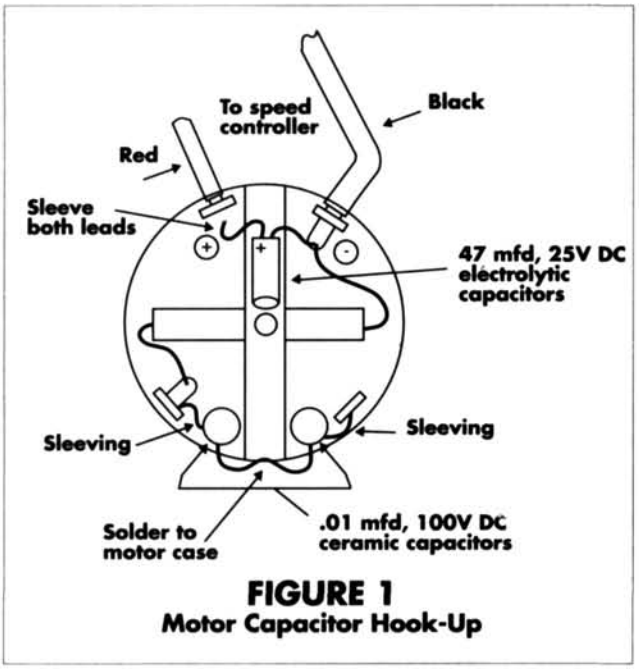


FIGURE 1
Motor Capacitor Hook-Up

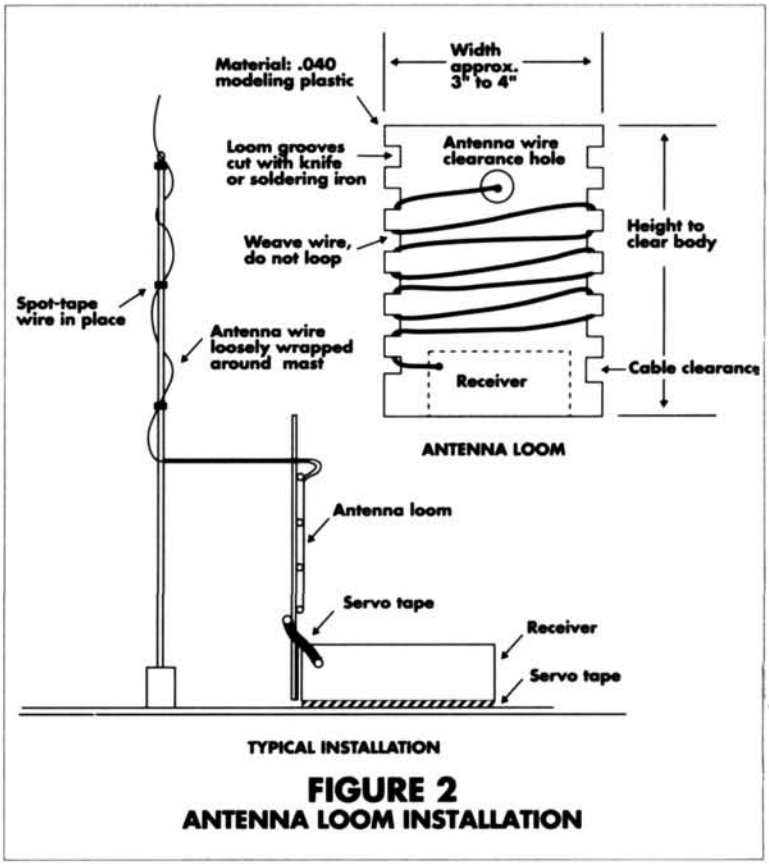


FIGURE 2
ANTENNA LOOM INSTALLATION

of the consequences before doing so.

If you choose to use fuses, please use high-grade automotive fuses, e.g., Little Fuse. A fuse is highly recommended for running a car for fun in your back yard.

• **Intermittent on/off switches.** Like connectors and fuses, switches are unreliable. A typical slide switch supplied with any speed controllers is susceptible to failure, intermittent operation, etc. A slide switch used in off-road is even more prone to failure because of the sandy, dusty and, sometimes, wet racing conditions.

Competitive racers don't need an on/off switch unless they directly solder their battery connections. The switch's only function is turning the receiver on and off. Once turned on, the receiver draws a trivial amount of current from the power packs, so there's no need to keep the receiver off once the race has been announced.

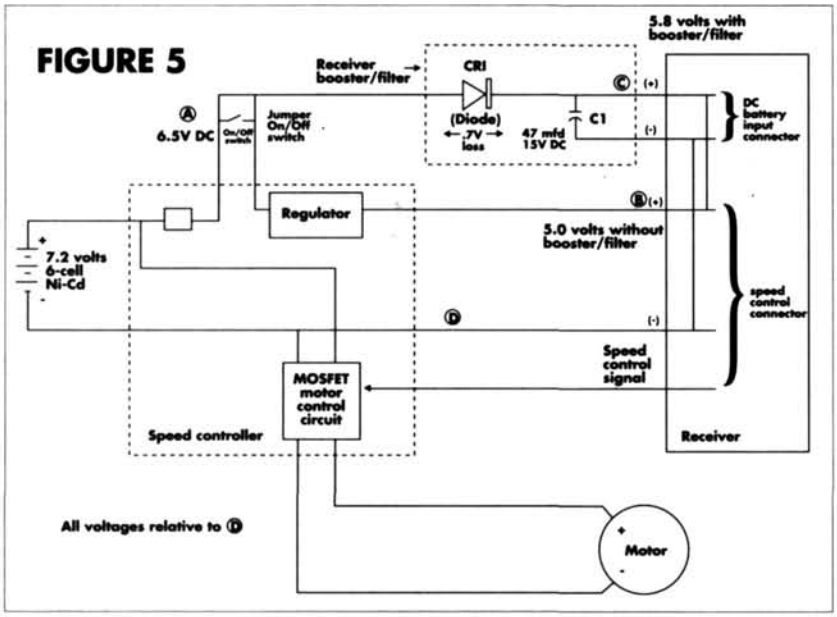
How do you disable a car's receiver when necessary? Pick up the car and turn it upside down; the car will go *nowhere!* From here, you can disconnect the battery connector without much difficulty, as long as the connector is as accessible as it should be. If you go without switches, plan your wiring layout so that the battery connector is readily accessible.

• **Improper mechanical layout** of electrical/electronic components. Thought spent on the layout of electrical components will result in shorter lead length, less electronic interaction and a neater overall electronic package. Your goal in making a layout is to keep the heavy-current motor leads and the battery leads as far away from the receiver as possible and as short as possible. This will prevent the heavy-current surges experienced under race conditions in these wires from reaching the highly sensitive receiver's input and local oscillator circuits.

An example of this is the way in which BoLINK's* Eliminator 10 is constructed. The Eliminator 10 instructions very clearly state where the speed controller and receiver should be mounted. Figure 4 shows a good component layout. Note that the wires going to the receiver are as short as possible, leaving only enough slack to easily connect and disconnect the receiver. Wires from the speed controller and the steering servo should be cut short and carefully spliced, because excess length could lead to glitches.

Note that the battery leads are routed so that the wires are next to one another. Keeping the battery wires paired will reduce the magnetic field created by the large current they carry. This magnetic field could glitch the receiver/controller.

As a general rule, avoid making loops with either the motor wires or the battery leads. Where possible, the positive leads and the negative leads should be twisted together, and where twisting isn't practical, spot-tie the wires using tie-wraps as



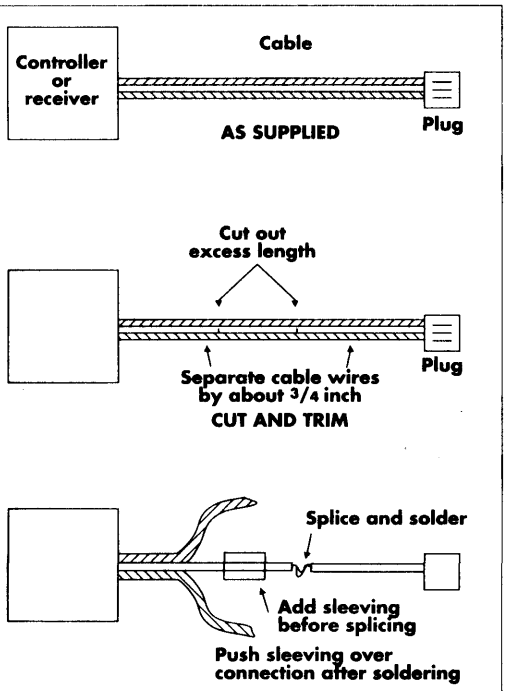


FIGURE 3
SHORTEN CABLES

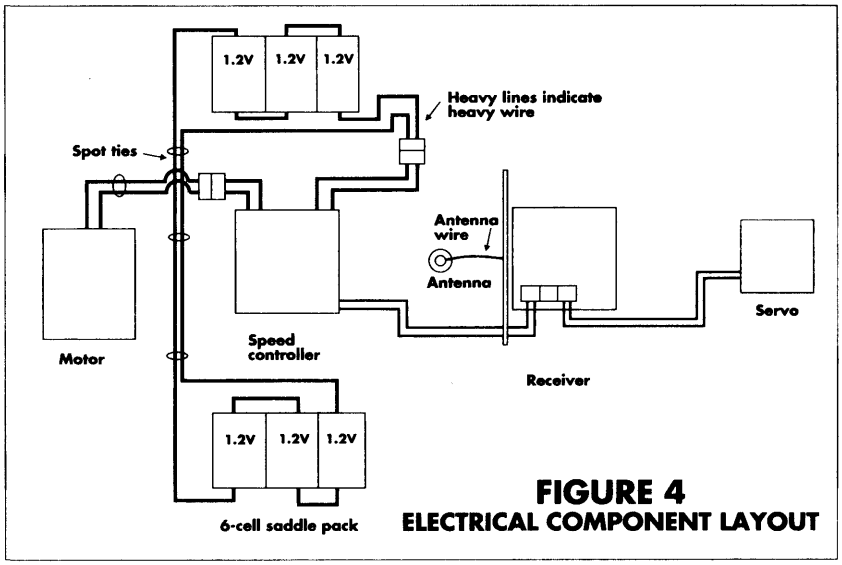


FIGURE 4
ELECTRICAL COMPONENT LAYOUT

shown in Figure 4.

• **Intermittent failure of receiver/transmitter**, such as broken printed-circuit board, bad component, etc.

If you've taken all the correct precautions to ensure glitch-free operation but *still* have glitches, your problem could be inside your receiver or transmitter. To determine whether or not this is causing glitches, you should completely replace both the receiver and transmitter with another transmitter/receiver pair. Borrow a working combination from a friend, or use a combination from one of your other cars. If the new combination seems to be glitch-free, your original combination is obviously defective.

The best way to repair your transmitter/receiver combination is by returning it to the manufacturer for expert service. When you do this, enclose a letter explaining the problem in as much detail as possible. It's also a good idea to ask the manufacturer to tune or realign each unit, and if you want to know the cost of this service, call their service department.

• **Operation of receiver at too low a voltage**. In summary, you'll get glitched if your receiver DC input voltage is too low. This is commonly identified as receiver dropout. You must take precautions that your receiver always operates with the DC input voltage recommended by the manufacturer.

All receivers have a range of input battery or supply voltage. This means that for the receiver to operate correctly as a receiver, the R/C racer must take pains to ensure that the correct voltage within the rated range is applied to the receiver at all times. Receivers made by Futaba* or Airtronics*, for example, are rated for a DC input voltage between 4.8 and 6.0 volts. The receiver must have this DC input voltage all the time or it either will work erratically or not at all. If the applied DC input voltage is below the range of the manufacturer receiver ratings, you'll get glitched. When you buy a complete radio system from Futaba or Airtronics, you'll get a receiver battery holder to hold four AA batteries. These batteries will supply 6.0 volts to your receiver. Your receiver will then always operate with the correct DC input and you'll never suffer from glitches caused by a receiver operating at too low an input voltage. (This assumes that the batteries are fresh and can produce 1.5 volts per cell.)

Racers can't tolerate the weight of four extra batteries to supply the power to the receiver. The solution to eliminating these batteries is the method Associated* describes in its RC10 assembly manual. This method is designed for the resistor-type speed controller, it but applies to electronic speed controllers as well. The 7.2V Ni-Cd is connected in series with a diode, which is then hooked into the receiver.

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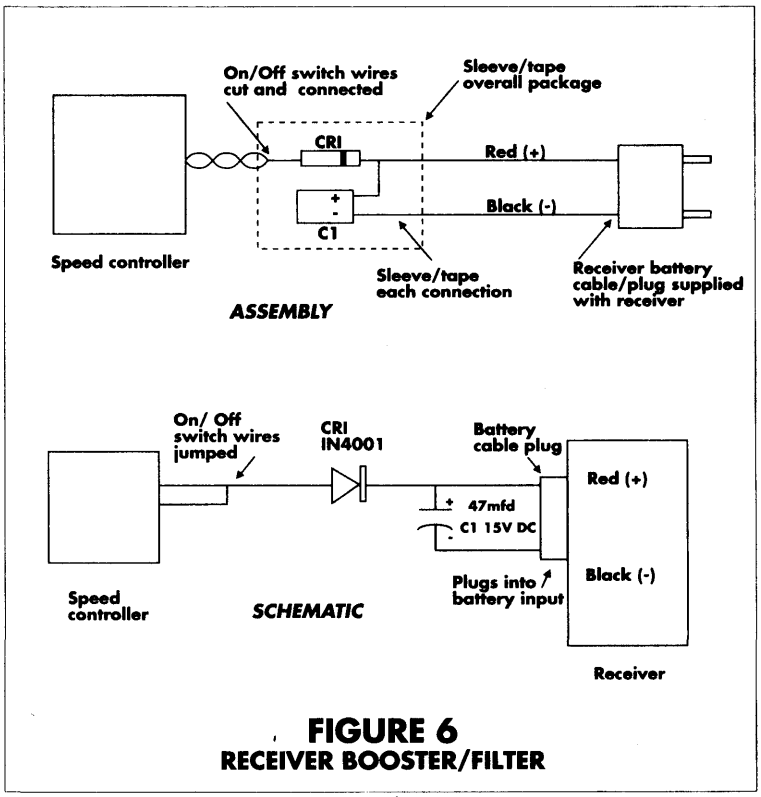

FIGURE 6
RECEIVER BOOSTER/FILTER

RC10 TORPEDO

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the batteries, early indications point in the more positive direction. Look for more of these chargers to surface in the future. With all the amenities attached and the batteries charged, go racing!

You don't think I'd do all this work to tell you that the car's a dog, do ya? Of course not. The revived RC10 runs as well as any car can be expected to. It accelerates like a bear and, on the straights, consumes real estate like a fox running through the hen house. Cornering is equally impressive, as you blip the brake to plant the front wheels and it swings around the turn as though it's attached to a maypole. On bumpy terrain, the car will get some air, as any car will, but it remains stable and headed in a straight line.

If you make these mods to your car, will it win the World Championships? That depends solely on your driving skill. The car itself is capable of competing anywhere, and with proper maintenance and driving skill, the sky's the limit. If you find that all this is hard to consume, you're not alone. Completing the work outlined here will require a large chunk of your time, but it doesn't have to be completed all at once. If you're equipped with necessities like a speed controller, motor batteries and charger, you can chip away at the remainder of the mods as time allows. Eventually, you, too, will have an RC10 Torpedo that can sink the toughest competition.

**Here are the addresses of the companies mentioned in this article:*

Associated Electrics, *3585 Cadillac Ave., Costa Mesa, CA 92626.*
Trinity, *1901 E. Linden Ave., #20, Linden, NJ 07036.*
Andy's R/C Products, *466 W. Arrow Hwy., Unit K, San Dimas, CA 91773.*
CRP *(Custom Racing Products), 3250 El Camino Real B-3, Atascadero,CA 93422.*
Team Losi, *1655 E. Mission Blvd., Pomona, CA 91766.*
Futaba Corporation of America, *4 Studebaker, Irvine, CA 92718.*
Tekin, *970 Negocio, San Clemente, CA 92672.*
Team Pit Stop, *12233 S.W. 132 Ct., Miami, FL 33186.*
Robinson Racing Products, *501 Peach, Santa Ana, CA 92704.*
Bud's Racing Products, *P.O. Box 601, Amherst, OH 44001.*
Astro Flight Inc., *13311 Beach Ave., Marina Del Rey, CA 90292.* ■

SPORTSMAN CUP

(Continued from page 54)

phies that the pros do after an event of this caliber. They practiced hard and earned their victory. They deserve it." And deserve, they did, with some spectacular performances. A couple of the fastest drivers even turned enough laps to put them in the middle of the pros if they'd been racing side-by-side.

As you may have guessed by now, this is not your standard race coverage that highlights the pro drivers and what equipment they used to get to the winners' circle. As the R/C media, it would be irresponsible on our part to focus on the products that made it to the A-Main at the Sportsman Cup. That approach would only make it more desirable for some manufacturers to send in a ringer with top-notch, unavailable equipment in hopes that their product will end up in the spotlight. While the equipment plays a role in overall performance, it was maintenance and driving skills that earned these drivers their victories. We want this concept to work. During an event that caters to professional drivers, the consumer can learn some valuable information as to which cars are working well, but with a race format such as this, there's no place for it. The spotlight goes to the race itself and the signal it sends to the enthusiast that manufacturers are becoming more involved in keeping the hobby growing. Although the race featured the Speedworks motors as a hand-out, considering the considerable cost of hosting an event of this caliber, this is well within Trinity's rights. Trinity's intentions, however,

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SPORTSMAN CUP

(Continued from page 138)

shouldn't be misinterpreted: When asked why he felt compelled to organize a race like this, Ernie Provetti echoed some of these same thoughts, and added, "I wanted to created a forum for enthusiasts to race against each other, without the pressure of being pushed through the heat only to watch the manufacturers engage in war to grab the top honors. And, with the seminars, the racers are able to ask valid questions without being laughed at by some drivers that think they should know these things or they shouldn't be racing. They deserve an honest answer." We asked if Trinity would support other manufacturers if they decided to organize the same type of race, and Ernie Provetti simply said, "Trinity will be there." ■

SCOPING OUT

(Continued from page 68)

improve the relay's reliability, Altech has used dual contacts.

Then came the fun part: field-testing the speed controller. I dug out my trusty Ultima 2WD car and mounted the PK 122

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SCOPING OUT

(Continued from page 143)

under its hood. With its full complement of connectors (no soldering required), this speed controller practically installs itself. My only gripe is the on/off switch. It seems that all the manufacturers of speed controllers leave off the mounting ears of the switch. With hard use, my switch always comes loose from the mounting tape. I'd much prefer to bolt the switch directly to the radio plate. This car is equipped with a Trinity* Monster Horsepower motor and a 6-cell battery pack. A quick battery charge and a trip to the track showed that all the adjustments made in the lab were still good. The forward throttle response is very smooth, and the delay between forward and reverse should go a long way toward preventing gear damage. With moderate gearing, the car ran 6 minutes and the heat sinks got quite warm, but the heat build-up wasn't excessive. The primary heat build-up was in the battery pack and the motor. This indicates that the battery juice is getting to the motor where it belongs, and is *not* being lost in the speed controller.

The speed controller is well-built, and with the built-in fuse, it should be bullet-

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SCOPING OUT

(Continued from page 150)

proof. I personally don't like relays, but the PK 122s seem to be well-designed and should be reliable. The instruction sheet is brief, but it contains all the information needed to install and set up the controller. I think the instruction sheet should include instructions for setting the servo end-point adjustment found on some transmitters.

The only outright mistake I found in the instruction sheet was the listing of the fuse as 25 amps in one place and 30 amps in another. The fuse supplied with the controller was a 25-amp fuse. (I called Altech and they informed me that they'd already found the mistake.) Altech's inclusion of a screwdriver was a nice touch.

The PK 122 was very easy to install and set up. Its performance numbers on the test bench indicate that it will deliver better performance than the mechanical speed controller it's intended to replace. Of course, it isn't in the same class as a $200 racing speed controller, but its $69.95 suggested retail price makes it a good choice for the first-time electronic-speed-controller shopper. This controller could well turn your no-run car into a fun-run car!

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SCOPING OUT

(Continued from page 164)

*Here are the addresses of the companies mentioned in this article:
Altech Electronics; distributed by MRC, 200 Carter Dr., P.O. Box 267, Edison, NJ 08818.
Trinity, 1901 E. Linden Ave., #20, Linden, NJ 07036.* ■

DIRT DIGEST

(Continued from page 77)

sense to reduce the weight of the electronics!

If you really want a surprise, weigh a nicely trimmed, clear, Lexan body. Then paint it, stripe it and put all the decals you want on it (don't forget the rear wing, too). Weigh it again when you've finished. I guarantee that next time, you'll think twice about putting on that seventh coat of yellow.

How far can you go? The sky is the limit—or, rather, your savings account is. This past weekend, I saw a $75 graphite chassis for an RC10 that would save not more than about 5 ounces.

Charlie, the third member of our impromptu group, has an Avante, and he has been looking at the titanium bits and

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DIRT DIGEST

(Continued from page 166)

pieces that are now available for it. Titanium is nice stuff. It weighs almost nothing, is as strong as the great outdoors and costs just a little less than the yearly budget for some small third-world countries. As soon as his daughter Melissa is old enough to get a job, he'll consider buying some of the bits and pieces.

All that attention to detail is why Bob won and, at the risk of preaching, that's also why we need an honest, stock, racing class to prevent people from literally *buying* a race by stuffing their cars with expensive lightweight components. You have to keep those newcomers smiling, or they won't stay around long enough to become older guys with funny painted cars.

Busted Clods and The End

We've been hearing a few complaints from Clod Buster owners about chassis breakage at the point where the A-arms mount to the tub. A quick survey of a few hobby stores was inconclusive: Some stocked spare tubs and others had heard nothing about any breakage.

Inquiring minds want to know if your Clod has busted and where it broke. (Charlie owns a Clod Buster too, so he's worried) Take a minute to jot down the circumstances, and if you want to make it a *fair* survey, if you own a Clod Buster that hasn't broken, send us a note describing how you use it. We might be able to compare notes and come up with some interesting conclusions.

Likewise, as we always say at the end of this column: If you have any difficulties or solutions, send them to us care of *R/C Car Action* magazine. See you next month, when we steal a little of John Rist's thunder by looking at the electrical sanity of motors and why they do (or don't do) what they do for you.

**Here are the addresses of the companies mentioned in this article:*
Aristo-Craft/Polk's, *346 Bergen Ave., Jersey City, NJ 07304.*
Novak Electronics, Inc., *128-C E. Dyer Rd., Santa Ana, CA 92707.*
Bru-Line Industries Inc., *P.O. Box 3786, Center Line, MI 48015.*
ProLine USA, *P.O. Box 456, Beaumont, CA 92223.*

■

AXIS EX

(Continued from page 80)

from the diff and motor. No torque-spinning here! On the straights, the Axis was a bit jumpy, and I found that this was caused by the kit-provided tires being a bit out-of-true. A short ride on the tire truer cured that, and the car rolled cleanly.

Initial lap times with the Axis were impressive, and this was *without* the luxury of dialing-in the car to suit my tastes. Others who drove the Axis said that the

(Continued on page 171)

AXIS EX

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car does well and is definitely competitive. Now, it's just a matter of time and taste. There's no doubt that the Axis measures up as a competitive car.

The Axis might seem expensive for a 1/12-scale road-racing vehicle, but you could spend less and come up with something that needs another $100 to make it competitive. I like a car that's competitive out of the box, and the Axis is one of the few that fit that description. It has an innovative design and competitive handling to satisfy the hot-shoe drivers. Kyosho has gotten serious in 1/12-scale racing. Its newest threat is the Axis. You'll be hearing from one of them *real* soon!

**Here are the addresses of the companies mentioned in this article:*
***Kyosho;** distributed by Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61820.*
***Dialed Racing Products,** 475 W. Hamilton, Suite 225, Campbell, CA 95008.*
***Pactra (Plasti-Kote),** 410 N. Michigan Ave., RM.1280, Chicago, IL 60611.*
***Reedy Co.,** 3585 Cadillac Ave., Costa Mesa, CA 92626.*
***Sanyo Electric,** Battery Division, 200 Riser Rd., Little Ferry, NJ 07643.* ■

TIRE TRUING

(Continued from page 84)

ber fly. The shaft collar is designed to accommodate virtually any standard-size rim on the market. Begin by placing the truing paddle flat against the tire. Slide the stop collar against the shaft end of the paddle and lock the collar tight. Now slide the paddle back away from the tire and

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TIRE TRUING

(Continued from page 171)

turn on the motor. Slowly slide the paddle towards the tire until light contact is made between the tire and the rough surface of the paddle, then start truing the tire with a back and forth motion of the paddle on the tire. (This motion ensures even truing.) Continue until the stop collar does its job and stops the paddle at the preset point, then take a ruler and carefully measure the tire's finished diameter. If you're not satisfied and want to reduce the diameter further, simply loosen the stop collar and slide it in until you've reached the desired diameter.

In Part II of this article, I'll show you how truing tires can give you a winning edge.

**Here's the address of the manufacturer featured in this article:*
Pro Proven Products, *363 6th Ave. West, Bradenton, FL 34205.* ■

NEW ENGLAND OVAL

(Continued from page 102)

NY, occupied the outside spot on the front row. Actually, his face didn't occupy the spot—his Can-Am-skinned Predator Lynx with a Revtech 16 double did. John Brunelle, of Lisbon, CT, placed his home-built car 3rd on the grid, using a Hot Rod Hornet body to keep his Trinity 14 double-powered car glued to the track.

The A-Main for the Off-Road Modifieds saw the pole car of Andrew Sapoznik lead most of the race until his batteries dumped with about 30 seconds

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NEW ENGLAND OVAL

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left. At that point, Joe Allevo's Reedy-powered home-built car took the lead, followed by J Car driver Darryl Poprosky (up from the last starting spot) and Scott Savro. And that's the way it finished, with Sapoznik able to hold onto 4th place.

The final race of the weekend was the Straight-Axle Modified A-Main. Hoyte Stacey absolutely exploded from the 2nd spot to lap the entire field at least once. This was a testament to his driving skill, as he was able to get through traffic, lap after lap, without any trouble. Credit also must go to the other drivers for staying out of the leader's way. Bruce Throne, yesterday's Off-Road Stock Champion, brought his fiberglass-chassis BoLINK Eliminator with a steel axle, to 2nd place after starting dead last on the grid. In these days of graphite, it's nice to see fiberglass and steel get the job done. Joe Allevo finished in the money once again, as he came from a 4th-place starting spot to grab 3rd with his home-built car under power from a Trinity 15 double motor.

At the end of the weekend, all these stories seemed to come together. Let the conclusion read that the wonderful atmosphere created by Karen and Nick Kahl, the K and N of K/N RC Speedway, made for good racing. Out-of-town drivers, using a variety of body styles, weren't dominated by local drivers. Bruce Throne, of Syracuse, and Joe Allevo, of nearby Ashford, CT, each won one class. Both were strong contenders in all four classes, as shown by the fact that they finished in the A-Main every time. To top it all off, Throne used an out-of-the-box JR-X2 and a BoLINK Eliminator, while Allevo ran home-built cars.

With some adjustments to the rules, next year's New England Indoor Oval Championships should be even better. I look forward to it. ■

RADIO GLITCHES

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The diode will cause a voltage drop of about 0.7 volt. This will supply about 6.5 volts to the receiver, which is slightly higher than the 6.0V rating, but it appears to work well.

Unfortunately, for cars with electronic speed controllers, life becomes difficult because the receiver operates with a voltage supplied by the speed controller. There are two fundamental problems with using speed controllers to supply the receiver's DC input voltage:

1. The voltage could drop to under 4.8 volts under a full acceleration condition. A hot stock motor or a modified motor could momentarily pull so much current that the speed controller output to the receiver could drop well below the required minimum voltage. This will result in a glitch.

2. The voltage to the receiver could be very close to the 4.8V minimum while the car runs at an average speed. On my Eliminator 10 with a Tekin-type speed controller, the receiver received only 5.0 volts before I made the booster/filter change (which I'll describe shortly). The receiver could be operating so close to the minimum that it could be on the edge of marginal performance.

A simple method is needed to keep the receiver DC input voltage well above the minimum required, no matter how much current the motor is drawing. Part of the solution to keeping the receiver DC input on the high side is to add an ordinary diode to bypass the speed controller DC regulator to the receiver. The other part of the solution is to use a large electro-

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RADIO GLITCHES

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lytic capacitor across the receiver's positive (+) and negative (-) input. The capacitor will filter out the effects of glitches caused by huge current surges (full-throttle accelerations). The combination of diode and capacitor produces a DC voltage input to the receiver that comes close to the four ordinary battery approach.

Using a booster/filter circuit, Figure 5 illustrates a typical speed controller connected to the 6-cell Ni-Cd, the motor and the receiver. The Ni-Cd supplies 7.2 volts to the speed controller. The speed controller distributes the 7.2 volts to the on/off switch, which in turn goes to the built-in regulator and ultimately to the receiver's speed controller connections. The receiver gets the DC input voltage from this connection. Aside from supplying the receiver voltage, the speed controller distributes the 7.2 volts to the MOSFET motor-control circuit.

With the booster/filter circuit shown, the DC input to the receiver is present at points B and C. The voltage at point A could be from 6.5 volts up to 7.2 volts. With the booster/filter absent, the voltage at B could be 5.0 volts, as governed by the speed controller regulator. When the booster/filter is hooked into point C, the diode will supply 5.8 (6.5 minus .7) volts to the receiver. The diode has the effect of overriding the voltage produced by the speed controller regulator circuit at point

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RADIO GLITCHES

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B. The receiver then has a 5.8-volt DC input.

Under full throttle, the battery voltage could momentarily drop. The capacitor will tend to keep the voltage to the receiver constant during this short interval until the battery comes back up to the 7.2 volts.

As an average racer with perhaps minimal electronic skills, a very simple solution is available and easy to do. First, look at your receiver instructions and find out what your receiver is rated for. Assuming you're using a speed controller, read the speed-controller manual and find out how many volts are produced for the receiver. If the manual doesn't state this number, you could call the manufacturer and ask for the output voltage. Even better, use a good digital voltmeter and measure the applied voltage at the receiver with the power pack plugged in. As an example, our Tekin controller produces 5.0 volts, and the receiver requires between 4.8 and 6.0 volts. Here, the controller DC output is so close to the lower end of the receiver requirement that this voltage should be increased. If you don't have a good digital voltmeter, ask around your track for some help. Perhaps someone who knows electronics can help make the measurement. This voltage is critical and must be determined.

If the applied voltage is either too low or too close to the lower limit, then you'll have to increase the voltage. The simplest way of increasing the receiver voltage is to connect a 1N4001 diode (Radio Shack IN4001 100V, 1 amp or equivalent).

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RADIO GLITCHES

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Using a booster/filter circuit, Figure 6 shows a Tekin controller connected to a Futaba receiver. The idea isn't limited to Tekin/Futaba combinations, but before you hook up other grand combinations, you should contact both manufacturers to ensure compatibility. Figure 6 also shows a 47mfd, 15V DC capacitor. The purpose of the capacitor is to keep the voltage to the receiver DC input from changing even while the motor may be pulling heavy current under high acceleration. The capacitor's value should be greater than 47mfd and the voltage rating at least 15V

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RADIO GLITCHES

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DC. Use of this capacitor as shown will filter noise spikes from the DC supply and will preserve receiver voltage in the event of momentary loss, e.g., a sudden motor current surge resulting in an instantaneous drop of power supply voltage.

- Contamination of third-order intermodulation. In a *Car Action* "Tech Tip," third-order intermodulation was described as a potential problem when transmitters that operate on channels separated by identical intervals interact and the lower channel is clobbered. For example: Channels 66, 70 and 74 are transmitting; the spacing is four channels. Channels 70 and 74 will interact and clobber 66. Race directors should be aware of this and should try to organize each heat so that the channels are separated by different channel spacings. For this example, the racer on channel 66 should move up to 68.
- **RFI from outside the racetrack.** If you're near a radio or TV station, a local ham operator, power lines, etc., there might be a signal nearby that's so strong that even a sharply tuned receiver can't reject it. In other words, you could still be "stepped on" by a nearby radio source.

If you've taken all the necessary precautions to eliminate your own self-induced glitches, I suggest that you contact your local FCC. This does take time, but if you think you're being "stepped on," you must take this route.

The operation of heavy electrical machinery nearby could also induce RFI. For instance, Island Hobby Raceway has an overhead space heater powered by a heavy-duty electrical motor. When this motor kicks in, cars get glitched, so we solve this problem by turning the heater off during races.

If you take the time to build your car correctly, most radio glitches can be overcome. By eliminating all the possible causes of glitches, you'll know that you've done everything you can to ensure maximum performance from your electronics. Eliminating electronic errors from your car allows you to spend more time racing and less time repairing glitch-induced damage.

Of course, you'll still be able to yell, "I got glitched!" the next time you make a sharp right into the wall while going down the backstretch; only you'll know the *real* reason for the crash! See you at the track.

**Here are addresses that are pertinent to this article:*
***Futaba Industries,** 4 Studebaker, Irvine, CA 92718.*
***Novak Electronics Inc.,** 128-C E. Dyer Road, Santa Ana, CA 92707.*

Team Losi, *1655 E. Mission Blvd., Pomona, CA 91766.*
Tekin Electronics, Inc., *970 Negocio, San Clemente, CA 92672.*
BoLINK, *420 Hosea Rd., Lawrenceville, GA 30245.*
Airtronics, Inc., *11 Autry, Irvine, CA 92718.*
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We think a lot of our readers have ideas that are worth sharing. How many times have you read an article and said "I could do that!" or "That's not the only way to do that; mine's easier!" Could very well be! Here's your chance! We'll be expanding **Radio Control Car Action** and are looking for additional contributors to help us accomplish this objective. Of key importance is the ability to take good photographs; the writing we can help you with. Interested? It's much easier than you might think.

Let's hear from you. Send in your ideas, articles, thoughts and photos; we're looking forward to it.

RICH HEMSTREET
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